Attachment, parenting stress and temperament across infancy in a community sample: Contributions to internalising versus externalising toddler behaviours

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A thesis submitted in fulfillment of the
requirements for the degree of
Doctor of Philosophy

School of Psychology
The University of Tasmania

October, 2014

Acknowledgements

The completion of this thesis has involved participation, advice and support from many parties. First and foremost I extend my gratitude to my supervisor, Professor Rapson Gomez, for the faith he showed in me, his critical feedback and infinite patience. Next, to the participants in this study, I express a sincere thank you. I was humbled and honoured by the mothers and their infants who volunteered their time and attention to the study at a highly significant and busy period in their own lives following the birth of their child. It was a privilege seeing the 4 month old babies who participated in the study grow into delightful toddlers.

There are several groups of professional and dedicated staff who assisted in the recruitment of participants to the study including those associated with Ballarat Maternal and Child Health, Ballarat Child and Family Services Day Stay Program, Ballarat Base Hospital and the Mercy Hospital for Women. I extend my special thanks to Andrew Lewis and Megan Galbally for assistance in the Mercy Health ethics submission. I am indebted to the kindness and support provided by Kevin Zibell, Georgina Anderson and the staff at Ballarat Child and Family Services. Together they provided funding for the study, which included my training in the Adult Attachment Interview and Strange Situation, assisted in recruitment, as well as in conducting the Strange Situation infant attachment measure at the Ballarat Child and Family Services offices. Similarly, I extend my gratitude to Jeanette Milgrom at the Parent Infant Research Institute, for the use of their interview rooms to also conduct Strange Situations. Georgina Anderson and Susan Paris conducted reliability coding for the Adult Attachment Interviews and Strange Situations respectively.

Lastly I will be forever grateful for the unending support and encouragement provided by my friends and especially by my partner and personal secretary, Glen, who has given unfailingly without complaint or criticism to support my endeavour.

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Abstract

Mental health problems affect around one in ten infants. Little is known however of the etiology of problem behaviours in infancy. Increased knowledge would inform early prevention and intervention programs. The current longitudinal study investigated the development of two year olds' internalising and externalising problem behaviours in a middle class, low risk, community sample of 121 mothers and their infants aged from 4 to 24 months. Mothers' parenting stress was conceptualised as key organising construct. Risk factors at 4 and 12 months were hypothesised to affect both parenting stress at 12 months and toddler problem behaviours at 24 months. Mediating and/or moderating effects were expected. Determinants and sequelae of parenting stress associated with the mother's relationship with her infant (parent-child) compared with stress associated with her relationships with others (parent-other) were investigated. Mothers and infants were expected to form at least two trajectories, high and low, according to their levels of parenting stress and socioemotional difficulty respectively. Trajectory membership was expected to be associated with predictable differences in levels of toddler internalising and externalising problem behaviours.

Empirical investigations supported direct effects of early maternal depression and maternal attachment anxiety on the development of parenting stress in mothers of 12 month old infants. Negative marital relations affected parenting stress indirectly via maternal depression. No protective effect of positive marital relations was observed. Infant attachment avoidance was negatively associated with parenting stress. Findings were similar for parent-child versus parent-other stress. Problem behaviours were not affected by demographic characteristics such as maternal age, education, family income or size, infant gender, or separation. Early maternal depression, infant socioemotional difficulty and difficult temperament and concurrent parenting stress predicted both toddler internalising and externalising problem behaviours. Effects of attachment anxiety and avoidance were small. Mediation and moderation by concurrent parenting stress was supported. Analyses

supported functional differences amongst maternal avoidant attachment strategies of idealisation, derogation and lack of memory. *At risk* (<16%) infants and mothers had higher toddler problem behaviours than *low risk* (>80%). *At risk* dyads included mothers with elevated scores around the referral level, on the Parenting Stress Index and the Center for Epidemiological Studies Depression scale and/or infants with elevated Ages and Stages: Social Emotional difficulty scores.

The current study demonstrated characteristics of both mother and infant were more important than relational factors in the development of toddler problem behaviours. Findings supported interactions amongst risk factors and the importance of infant and maternal attachment anxiety and avoidance for delineating specific pathways to toddlers' internalising versus externalising problem behaviours. Risk profiles for problem behaviours in two year olds were found to be established by four months of age. Implications included early mother and infant screening for mental health difficulties and targeted interventions for *at-risk* mother-infant dyads.

Declaration

The research report in this thesis is entirely original. It has not been, and is not being, submitted for the award of any degree or diploma at any other university. Except where due reference is made, all other material contained in this thesis is the author's own work.

Statement of Ethical Conduct

The research associated with this thesis has been conducted in accordance with the Australian National and Medical Research Council National Statement on Ethical Conduct in Human Research and abides by the requirements of the human research ethics committees of the University of Ballarat, the University of Tasmania, the Victorian Department of Human Services, Ballarat Health Services and Mercy Health.

Chapter 1

Infant problem behaviours: Early risk markers for some, normative behaviour for others

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1.1 Introduction

The primary focus of this thesis is to increase understanding of the etiology of social emotional difficulties in infants and toddlers in the general population. Mental health difficulties for some have been shown to emerge in infancy and persist throughout childhood and adult life (Egger & Angold, 2006). Whilst difficulties have been shown to run in families, little is known of the mechanisms affecting the development of early occurring problem behaviours particularly in low risk populations. Family system theory has emphasised interdependency amongst family system dimensions including parent and child personality and psychopathology, relationships between parents, with their child and with their families of origin, and current circumstances including social support and life stress and parent and child mental health and wellbeing (Belsky, 1984; Cowan & Cowan, 1995).

Empirical research has supported family system theory in older children however until recently there has been less research emphasis on infant populations (Grant et al., 2006; Gross, Shaw & Moilanen, 2008). The extensive infant attachment research has purported attentional and emotion regulation restrictions, which develop in the context of the parent-infant relationship in the first twelve months postpartum, affect all future relationships (Cassidy, 1994; Hill, Fonagy, Safier & Sargent, 2003; Main, 2000). Thus maternal and infant attachment can be expected to affect all aspects of the family system. Despite the theoretical linkage there has been little integration across the family systems and attachment bodies of literature particularly in low risk infant populations.

Developmental research has also been criticised for its lack of attention to real world complexity including transactions over time within and between aspects of the family system (Lewis, 1997; Thompson & Raikes, 2003). Recently developmental

cascade models have been used to approximate the unfolding of developmental constructs over time both in interaction with themselves across time and with other constructs within and across time (Masten & Cicchetti, 2010). Developmental cascade models take across time stability of constructs and within time covariation amongst constructs into consideration in accordance with transactional models of development (Bell, 1979; Cicchetti, 1990; Masten et al., 2005; Sameroff & Mackenzie, 2003). However extremely large numbers are required to model the numerous meaningful interrelations simultaneously. It has also proved difficult to capture relations further down the developmental chain once earlier autoregressive effects have accounted for a substantial amount of the variance (Eisenberg et al., 2010). Thus developmental modeling involves balancing the approximation of real world complexity with parsimonious model construction capturing substantive, theoretically and empirically meaningful relations that may inform prevention and intervention programs.

Just as characteristics of the child, such as temperament and socioemotional adjustment, develop over time, so too do maternal and relationship characteristics and aspects of the rearing environment such as parenting stress (Crnic & Booth, 1991). Analyses in this thesis represent a parsed developmental cascade model of the interactions between family systems and attachment dimensions purported to affect the development of problem behaviours over the first two years postpartum. This pragmatic approach enabled investigations of the unfolding of meaningful relations affecting the development of toddler internalising and externalising problem behaviours within an integrated family systems and attachment framework in a moderately sized sample. The focus of this chapter is to provide an overview of current knowledge of infant problem behaviours, including their characteristics and prevalence. Literature findings supporting a central role of parenting stress, infant temperament and attachment in the development of toddler problem behaviours are presented in Chapters two to five. Effects of other aspects of the family system on the development of toddler problem behaviours are proposed to be both mediated and moderated by parenting stress (Kobak, Cassidy, Lyons-Ruth & Ziv, 2006). However whereas parenting stress is presumed to reflect generic risk, it is

argued dimensions of maternal and infant attachment anxiety and avoidance and infant temperament have the potential to increase knowledge of developmental mechanisms associated with the development of toddler internalising versus externalising problem behaviours.

In the current study, maternal and infant characteristics are represented by maternal depression and infant difficult temperament. Family systems relationships are represented by maternal and infant attachment and marital relations. Social support and life stress are represented by parenting stress. Maternal attachment was assessed when infants were 4 months old and infant attachment when they were 12 months old. Other constructs were assessed when infants were aged 4, 12 and 24 months postpartum. Paths to parenting stress at 12 months from concurrent infant attachment and early maternal attachment, difficult temperament, marital relations and maternal depression are presented in chapter six. Findings from regression analyses predicting toddler internalising and externalising problem behaviours from dimensions of the family system across the first two years of life postpartum are presented in chapter seven.

Whereas variable-centred analyses identify risk and protective factors and potential mechanisms of the intergenerational transfer of risk, person-centred research identifies who is most affected by risk and who may benefit most from targeted interventions. Chapter eight investigated the identification of mother-infant dyads at risk for maternal mental health difficulties and the development of toddler problem behaviours. Latent growth analyses of parenting stress and social emotional difficulty across infancy and problem behaviour classes of toddlers are presented in chapter eight. Thus analyses from the three empirical chapters investigated the development of parenting stress, the parent-child attachment relationship and the development of toddler internalising and externalising problem behaviours from other aspects of the family system in the first two years postpartum. Investigations incorporated interactive and reciprocal effects in accordance with developmental pathways models as proposed by Kobak, Cassidy, Lyons-Ruth and Ziv (2006).

This chapter will discuss the importance of infancy for the emergence of infant mental health difficulties. This will be followed by a conceptualisation of infant mental health difficulties as internalising and externalising problem behaviours. The use of two measures, the Child Behavior Checklist (Achenbach & Rescorla, 2000) and the Ages and Stages Social Emotional Questionnaires (Squires, Bricker & Twombly, 2002) for the identification of mental health difficulties in infants and toddlers will be discussed next. Lastly, research investigating trajectories of problem behaviours across infancy will be presented. Discussion will provide support for the early emergence of a stable "at risk" trajectory in low risk infant populations for both internalising and externalising problem behaviours.

1.2 The emergence of mental health difficulties in infancy

Infant mental health knowledge has come a long way in the last decade. At the end of the twentieth century the prevailing view was that young children's problem behaviours and mental health difficulties were transient and that children would just get over them on their own as they matured. Some ten years on it is now well established and accepted that whilst problem behaviours for some children appear to be related to achieving developmental transitions, for others, problem behaviours persist and are associated with mental health difficulties throughout their lives (Briggs-Cowan, Carter, Bosson-Heenan, Guyer & Horowitz, 2006; Carter, Briggs-Cowan & Davis, 2004; Greenberg, Speltz & DeKlyen, 1993; Mathiesen & Sanson, 2010; National Scientific Council on the Developing Child, 2008).

Categorical estimates of the prevalence of mental health disorders in infants and toddlers are between 10% and 15%, similar to rates for older children (Bayer, Hiscock, Ukoumunne, Price & Wake, 2008; Briggs-Cowan, Carter, Skuban, & Horowitz, 2001; Carter, Briggs-Cowan & Davis, 2004; Egger & Angold, 2006; Koot, Van Den Oord, Verhulst & Boomsma, 1997; Sanders, Gooley & Nicholson, 2000; Sawyer et al., 2000; Skovgaard et al., 2007). Dimensional estimates of the prevalence of clinical levels of problem behaviours in the general population however are much less, with around 2% of infants and toddlers showing clinical level internalising and

externalising problem behaviours. Around 7% of infants and toddlers display borderline clinical symptoms (Achenbach & Rescorla, 2000). Toddlerhood has been identified as a critical period for the emergence of problem behaviours in some children (Baillargeon et al., 2007). Individual differences in emotional control and coping skills that are developing in infancy can become emotional behavioural difficulties that are evident and persist in preschool and beyond (Kopp, 1982, 2002). Half of all mental health problems have been shown to begin before the age of 14 years (Kessler et al., 2005). Children with mental health problems have been shown to be at increased risk of ongoing adverse outcomes continuing into adulthood including poor school performance, ongoing mental health difficulties, delinquency and criminality (Arnold et al., 2006; Egeland, et al., 1996; Raphael, 2000; Tremblay, 2000).

Current research indicates elevated levels of problem behaviours in infancy and toddlerhood are related to poorer subsequent outcomes. For example, Briggs-Cowan et al., (2006) reported that Brief Infant and Toddler Social and Emotional Assessment (BITSEA), scores above the clinical cut off predicted poorer primary school outcomes. Similarly, Blandon, Calkins and Keane (2010) demonstrated children with clinical level externalising problem behaviours and emotion regulation difficulties at age two years, were at the highest risk for social and emotional difficulties in kindergarten, were less liked by their peers and had maladaptive regulation strategies. They recommended the investigation of problem behaviours in children younger than two years of age to further clarify the development of risk.

Thus mental health disorders in children and young people in Australia represent a large public health problem (Australian Infant, Child, Adolescent and Family Mental Health Association, 2011). There are significant costs, both economic and personal, to both individuals with mental disorders and to the community, resulting from childhood mental health problems. Early prevention and intervention programs have demonstrated greater efficacy than interventions later in life (Campbell, Shaw & Gilliom, 2000; Shaw, Connell, Dishion, Wilson & Gardner, 2009). However, only a small proportion of children, less than a third, with significant

mental health problems have contact with mental health services (Sawyer, 2000; Starr, Campbell & Herrick, 2002). Thus infancy mental health research in the general population is warranted.

The earlier problem behaviours are recognised and their trajectories understood, the better the outcomes are likely to be for the child, the family and for the wider community. Campbell, Shaw and Gilliom (2000) observed that persistent problem behaviours were resistant to intervention in school age children. They emphasised the importance of prevention and intervention in early childhood to ameliorate problem behaviours before maladaptive behaviour patterns became too entrenched. Early intervention has been shown to be effective, improves human social capital and saves society significant expenditure in treating adult mental health difficulties and managing the criminal justice system (Giesen, Searle & Sawyer, 2007; Center on the Developing Child at Harvard University, 2007; Nelson, Westhues & McLeod, 2003; Sanders, Gooley & Nicholson, 2000).

1.2.1 Summary

Mental health difficulties have been shown to appear early, in the first two years of life, at rates similar to those in older children. For some, these have been shown to persist throughout childhood and beyond. Infant mental health difficulties have been associated with increased subsequent risk affecting all aspects of life including school performance, employment and mental health and wellbeing into adulthood. Increased understanding of the etiology of mental health problems in infants and toddlers in the general population will inform the design of early childhood prevention and intervention programs. The next section will discuss current understanding of the presentation of infant mental health difficulties, which have been conceptualised as either internalising or externalising probem behaviours.

1.3 What do mental health difficulties in infants look like?

Mental health difficulties in young children are indicated by the presence of problem behaviours. These are generally exhibited when the demands and stresses in a child's environment exceed their capacity to cope and the child may be unable to manage the levels of emotion they are experiencing. Two broadband factors of problem behaviours, internalising and externalising, used for older children and adults, have also been found to be applicable to describing problem behaviours in infants aged 18 months to 3 years postpartum (Achenbach, 2000; Achenbach, Edelbrock & Howell et al., 1987).

1.3.1 Internalising problem behaviours

Internalising problem behaviours reside mainly within the child and have been presumed to be associated with either depression or anxiety (Achenbach & Rescorla, 2000; Mathiesen & Sanson, 2000). Behaviours include social withdrawal or emotion dysregulation with heightened sadness, fear or wariness, an inhibited approach to novelty, lack of energy, irritability, sleep and eating disturbances or diminished joy (Angold, Costello, Erkanli, 1999; Brumariu & Kerns, 2010; Frick & Morris, 2004; Silk. et al, 2006). Internalising problem behaviours are characterised by feelings of negative self worth and competence and lacking control (Chorpita & Barlow, 1998). Children with negative emotionality, low emotional and attentional control, low impulsivity, high inhibition and autonomic overarousal have been found to be predisposed to engage in internalising problem behaviours (Burgess, Marshall, Rubin, & Fox; Degnan & Fox, 2007; Eisenberg, Fabes, Guthrie & Reiser, 2000: Fox, Kimmerley & Schafer, 1991; Gartstein & Bateman, 2008; Janson & Mathiesen, 2008; Mun, Fitzgerald, Von Eye, Puttler, & Zucker, 2001; Prior, Sanson, Smart & Oberklaid, 2000; Putnam & Stifter, 2005; Schwartz, Snidman & Kagan, 1999; Shiner & Caspi, 2003).

1.3.1.1Why do infants develop internalising problem behaviours?

Internalising problem behaviours have been reported to be highly heritable (Albano, Chorpita & Barlow, 2003; Derks, Hidziak, van Beijsterveldt, Dolan & Boomsma, 2004; Kim-Cohen, Moffit, Taylor, Pawlby & Caspi, 2005; van den Oord, Verhulst & Boomsa, 1996; van der Valk, van den Oord, Verhulst & Boomsma, 2001; Williamson, Forbes, Dahl & Ryan, 2005). In a large Dutch twin study, Van den Oord et al. (1996) found just 23% of the variance in CBCL internalising problem behaviours in three year old children was explained by rearing environment factors. Further, Bosquet and Egeland (2006) showed heightened biobehavioral reactivity and poor regulation in babies 7-10 days old, predicted emotion regulation difficulties in preschool and in turn, anxiety symptoms in childhood. However, a recent large French community twin sample has demonstrated greater influence of shared environment effects on internalising problem behaviours in younger children around two years of age than in older children (Saudino, Carter, Purper-Oakil & Gorwood, 2008).

Maternal anxiety has been shown to be related to child anxiety (Costa & Weems, 2005; Shamir-Essakow, Ungerer & Rapee, 2007; Spence, Najman, Bor, O'Callaghan & Williams, 2002). An anxious parent may indicate increased genetic risk of child anxiety and may also model and/or reinforce anxious behaviours (Kerns, Siener & Brumariu, 2011; Moore, Whaley & Sigman, 2004). Thus genetic and social learning mechanisms are implicated in the intergenerational transmission of anxiety. Two aspects of the parent-child relationship that have been implicated in the development of anxiety are compromises in the attachment relationship and parenting quality (Kerns et al.). Overprotective parenting may amplify a child's internalising tendencies through modeling, reinforcement and a lack of opportunities for mastery experiences (Chorpita & Barlow, 1998; Ginsburg, Grover, Cord & Ialongo, 2006; McLeod, Weisz & Wood, 2007; Shaw et al., 1998; Thomasgaard, 1998).

Toddlers may avoid social interaction due to a negative interactional history that has been characterised by rejection or neglect. Perhaps these children have never had a consistently available caregiver accessible to help them try to regulate

their emotions or have experienced a harsh, punitive caregiver with whom they are frightened to interact and hence have become used to trying to deal with difficult emotions themselves (Cassidy & Kobak, 1988; Cassidy & Berlin, 1994; Main, 2000). Social withdrawal has been linked with internalising behaviours (Sanson, Hemphill & Smart, 2004). These behaviours are similar to those seen by 12 month old infants using avoidant attachment strategies in the Strange Situation. Thus an association between infant attachment avoidance and internalising problem behaviours seems likely.

1.3.2 Externalising problem behaviours

Externalising problem behaviours are associated with difficulty in impulse control (Asendorpf & van Aken, 1998; Rubin, Hastings, Chen, Stewart & McNichol, 1998). They generally involve conflict with other people and include behaviours such as inattention, low inhibition, autonomic underarousal, overactivity, high emotionality, impulsivity, dysregulation, aggression and non-compliance (Achenbach & Rescorla, 2000; Angold, Costello, & Erkanli, 1999; Burgess, Marshall, Rubin & Fox, 2003; Eisenberg, Fabes, Guthrie & Reiser, 2000; Fox, Kimmerly & Schafer, 1991; Mathiesen & Sanson, 2000). Externalising behaviours in toddlers consist of defiance, aggression and tantrums.

1.3.1.2 Why do infants develop externalising problem behaviours?

Infants are presumed to engage in externalising problem behaviours for instrumental and autonomy-seeking motives (Crockenberg & Litman, 1990). For example, disruptive behaviour such as tantrums and hitting could serve to get the attention or control the behaviour of unresponsive or unpredictable caregivers. For some infants, externalising problem behaviours represent transient normative infant behaviour. This is particularly true in the second year as toddlers express their developing their sense of self and autonomy through frustration, conflict or non-compliance (Campbell, 1995; Campbell, Shaw & Gilliom, 2000). These behaviours are similar to those shown by 12 month old infants who show resistance to being comforted by their parents in the Strange Situation infant attachment paradigm.

Thus Strange Situation resistance may be expected to be associated with externalising problem behaviours. Possible mechanisms include poor caregiver communication and unshared goals and plans due to caregiver inability to take the perspective of their child (Shaw & Bell, 1993).

Researchers have conceptualised externalising problem behaviours as reflecting a lack of control resulting from fearlessness, low inhibition or attentional control and high impulsivity (Schwartz, Snidman & Kagan, 1997), or from rearing factors such as ineffective parenting strategies including inappropriate limit setting (Caspi & Silva, 1995; Guttmann & Crowell, 2006; Putnam & Stifter, 2005). Relatedly, rearing environment effects have been shown to explain relatively more of the variance in externalising than internalising problem behaviours in older children (40% versus 23%; Rhee & Waldman, 2002; Van den Oord, Verhulst & Boomsma, 1996). In a recent twin study, significant shared family environment influences (greater than 50%) explained externalising problem behaviours of aggression, and compliance in young children aged around 2 years (Saudino, Carter, Purper-Oakil & Gorwood, 2008). Relatedly, Pemberton et al., (2010) demonstrated environment effects of adopted mothers', but not biological mothers', depression on the development of externalising problem behaviours in toddlers.

1.3.3 Co-occurrence of internalising and externalising problem behaviours

Some children in the general population are found to have elevated levels of both internalising and externalising problem behaviours (Oland & Shaw, 2005; Lilienfeld, 2003; McConaughy & Achenbach, 1994). Achenbach, Howell, Quay and Connors (1991) have reported a large effect size (r=.51), for the relation between internalising and externalising problem behaviours in two and three year olds using the CBCL (Child Behavior Checklist; Achenbach & Rescorla, 2000). Relatedly, confirmatory factor analysis of the CBCL determined four groups of problem behaviours in children aged 4-12 years: pure externalising, pure internalising, co-occurring internalising and externalising and low levels of either type of problem behaviour (Keiley, Lofthouse, Bates, Dodge & Pettit, 2003). It has been suggested children with covarying problem behaviours may represent different underlying

pathology and different syndromes, or have different etiological pathways from those displaying problem behaviours in only one dimension (Angold & Costello, 1993; Lilienfeld, 2003).

1.3.3.1 Why do some infants exhibit both internalising and externalising problem behaviours?

Shared factors, such as a child having a vulnerable temperament or experiencing a compromised rearing environment, are associated with both internalising and externalising problem behaviours. For example, negative emotionality and distress underlie both internalising and externalising problem behaviours (Keiley, Lofthouse, Bates, Dodge & Pettit, 2003; Oland & Shaw, 2005). Consistent with this hypothesis, O'Connor et al. (1998) reported genetic factors explained 45% of the covariance between depression and antisocial behaviour.

Rearing environment risk has been shown to be particularly important in the co-occurrence of internalising and externalising problem behaviours (Mun, Fitzgerald, Von Eye, Puttler & Zucker, 2001; Shaw, Owens, Giovannelli & Winslow, 2001). Some researchers have suggested co-occurrence represents more severe compromise (Oland & Shaw, 2005). Others have suggested co-occurrence reflects a more general early compromise that becomes more specific with development (Nottlemann & Jensen, 1995). Thus it is possible co-occurrence rates may vary with developmental stage.

There is currently no etiological model to account for the co-occurrence of internalising and externalising problem behaviours (Gilliom & Shaw, 2004). These authors noted the few infant studies of problem behaviours that do exist considered either total problem behaviours, or internalising or externalising problem behaviours separately. Thus there is little current knowledge of the factors that contribute to the high co-occurrence of toddlers' internalising and externalising problem behaviours.

1.3.4 Summary

Infant mental health difficulties have been described as manifesting as either internalising or externalising problem behaviours. Internalising behaviours include social withdrawal, fearfulness and general anxiety. Externalising behaviours include "acting out" behaviours involving defiance and aggression. Some infants exhibit both internalising and externalising problem behaviours. There is support for both heritability and environmental rearing factors in the development of infant mental health difficulties. Whereas heritability seems to be relatively more important for the development of internalising problem behaviours, rearing environment risk seems more important for the development of externalising problem behaviours. Factors affecting the development of toddler problem behaviours will explored in Chapters two to five.

1.4 Identifying infants at risk for mental health difficulties

Earlier discussion highlighted current consensus that increased risk of behaviour problems can be discerned within the first two years of life. Risk factors for internalising and externalising problem behaviours include insecure attachment, ineffective parenting, high family adversity and atypical child characteristics (DeKlyen & Greenberg, 2008). However the relatively undifferentiated nature of infant behaviour has discouraged researchers from investigating early infant risk markers for later mental health difficulties (Zentner & Bates, 2008; Mathiesen & Sanson, 2000). Thus compared with preschoolers and school aged children there is a paucity of research on the development of infant problem behaviours.

Partially due to the misconception that young children do not have mental health diffculties or that they will grow out of them, the rate of identification of young children at risk of experiencing mental health difficulties has traditionally been very low (Lavigne et al., 1993). Until recently, there has been a lack of measures with demonstrated validity for identifying infants at social emotional risk in the general population. Two measures that are beginning to be widely used with infants are the Ages and Stages Questionnaires Social Emotional (ASQ:SE; Squires, Bricker &

Twombly, 2002), and the Child Behavior Checklist (CBCL 1 $^{1}/_{2}$ -5; Achenbach & Rescorla, 2000). The CBCL provides three measures of total, internalising and externalising child problem behaviours. It is a widely used and internationally validated measure of caregiver reported child problem behaviours with minimal gender and age effects particularly with children at the lower end of the age range.

The ASQ:SE is a series of internationally validated questionnaires of self-regulation and interaction behaviours of children aged 3 to 60 months. It was designed as a screening instrument for detecting children at risk for social and emotional adjustment difficulties and has demonstrated good sensitivity and specificity (Squires, Bricker, & Twombly, 2004). Proportions of infants above the referral cut off are generally around 10% in accordance with infant mental health prevalence statistics. For example, eight percent of 6 month old infants in a low risk population sample of 334 Dutch babies had elevated social emotional difficulty above the empirically derived cutoff (Vissenberg, 2010). The more attached the mother felt to her 6 month old baby, the fewer social and emotional adjustment problems she reported for her baby. Risk factors for elevated infant social emotional difficulty include self reported maternal stress and depression (Salomonsson & Sleed, 2010). Squires et al. observed there were no gender differences in caregiver reported social and emotional difficulties for infants and toddlers aged between six months and two years.

Both the ASQ:SE and CBCL involve parent report of child behaviour. Research has supported the validity of maternal observation of child behaviour (Rothbart & Bates, 1998; Rothbart & Hwang, 2002; Richters, 1992). For example Richters concluded there was little distortion in maternal reports of child behaviour due to elevated maternal depression. Despite increased shared parenting, predominantly mothers continue to be the child's primary caregiver in the first two years of life, and thus see a wide range of their child's behaviour, across a variety of settings and people. Fathers on the other hand continue to be predominantly the child's secondary caregiver, and although close to their child, generally do not spend as

much time with them or indeed with other children, as the mother does. Thus fathers offer a different perspective on their child's behaviours.

1.4.1 Summary

Until recently, infants have not been widely assessed for mental difficulties with resulting low rates of engagement with the mental health system despite demonstrated prevalence rates similar to those of older children. The ASQ:SE has been developed as a screening instrument for social emotional difficulties from three months to five years of age. The CBCL measures levels of internalising and externalising problem behaviours in young children aged $1^1/_2$ to five years of age. Both measures involve parent reporting of their child's behaviour which has demonstrated validity in low risk populations. The next section will discuss existing person-centred research using these measures to assess trajectories of infants "at risk" versus "low risk" for mental health difficulties.

1.5 Trajectories of problem behaviours across infancy

It is important to consider patterns of stability and change in problem behaviours in young children over time in order to distinguish between "at risk" and "low risk" children, persistent versus transient problems and early versus late onset trajectories. It has been purported some early problem behaviours could be due to individual variation in negotiating developmental transitions that settle down with subsequent development (Biringen, Emde, Campos and Applebaum, 1995; McGuire & Richman, 1986). For example, externalising problem behaviours decrease for most children from 2 to 4 years of age whereas internalising problem behaviours increase for some children (Degnan, Calkins, Keane & Hill-Soderlund, 2008; Hill, Degnan, Calkins & Keane, 2006; NICHD & Arsenio, 2004; Tremblay, 2000; Tremblay et al., 2004).

Whereas variable-centred analyses have higher power for detecting associations amongst risk factors and outcomes, person-centred analyses are preferable for discerning developmental patterns and the identification of subsets

within a population that are presumed to differ from one another in meaningful ways (Hart, Atkins, Fegley, Robins & Tracy, 2003; Nagin, 1999; Von Eye & Bergmann, 2003). Thus person-centred analyses have utility for identifying and describing risk profiles of “at risk” versus low risk infants and toddlers. Latent growth mixture analysis estimates separate trajectories for each unobserved subpopulation (Curran & Hussong, 2003; Curran & Willoughby, 2003). Classes and trajectories of child and adolescent problem behaviours have been shown to reflect differences in symptom levels and not different profiles of symptomatology (Mezulis, Vander Stoep, Stone & McCauley, 2011). According to the authors, classes differentiated by symptom type may unfold with increased age.

As behaviour becomes increasingly complex and differentiated with development, it is unlikely that trajectories of problem behaviours in infancy will look like those in preschoolers and middle childhood which have been shown to be moderately stable from age three onwards (Campbell, 1995; Sanson, Pedlow, Cann, Prior & Oberklaid, 1996). There is currently a limited but growing body of knowledge of the risk and protective factors affecting trajectories of problem behaviours in toddlers from around two years of age upwards. There is less knowledge considering internalising and externalising problem behaviours as separate dimensions of toddler adjustment with different etiology, risk profiles and developmental pathways (Barnett, Shanahan, Deng, Haskett & Cox, 2010).

Mathiesen and Sanson (2000) conducted one of the few person-centred studies of infant internalising and externalising problem behaviours in a low risk toddler population. Mother reported problem behaviours in a community sample of 750 Norwegian toddlers were investigated using the Behaviour Checklist (BCL) at 18 months and 30 months. Children with scores 1.5 standard deviations above the sample mean were classed as being “at risk” of problem behaviours on two externalising factors of antisocial and overactivity/inattentiveness and one emotionality internalising factor. Most children had no problems at either time (>80%). The remaining children either had transitory problems that were present at

18 months but absent at 30 months (<10%), late-onset problems (<10%) or stable problems (<5%).

Problem behaviours were present for some children only during the development transition across toddlerhood whereas for a small group of toddlers early problems persisted. Thus it is important longitudinal investigations span across developmental transitions to distinguish between transient and persistent problems. Children with stable problem behaviours had the highest level of problem behaviours and the highest level of risk. Maternal anxiety and depression, parenting stress and negative life events, lack of social support and infant emotionality, similar to difficult temperament, assessed when toddlers were 18 months old, predicted stable high levels of both internalising and externalising problem behaviours and were thus generic risk factors of problem behaviours. Note there was no assessment of relationship effects on toddler problem behaviours.

The Mathiesen and Sanson (2000) study began towards the end of infancy when toddlers were 18 months old and did not capture early risk factors present in the sensitive first twelve months postpartum. Further, problem behaviour levels were dichotomised (above and below 1.5 standard deviations above the sample mean), and the study included only two time points. Latent growth mixture modeling extracts naturally occurring patterns in the data, requires a minimum of three time points and is preferable to such artificially created divisions.

Squires, Bricker and Twombly (2004) reported increasing levels of social and emotional problem behaviours in children aged 6 to 60 months using the ASQ:SE. ASQ:SE scores for children in the “no risk” group remained well below the referral cut offs. Scores for the “at risk” group ranged from around 25 at 6 months to around 50 at 24 months on average. The latter was at the referral cut off. Children in the high risk group with known social and emotional difficulties had scores that were consistently above referral cut offs. The study however was cross sectional and children were classed into apriori risk groups, thus no inference regarding individual trajectories could be made. The current study will address some of the limitations of

the two studies described above by conducting latent growth mixture analysis of social emotional difficulty in a low risk sample of infants aged 4, 12 and 24 months.

1.5.1 Trajectories of externalising problem behaviours

There is a substantial body of knowledge of trajectories of externalising problem behaviours, particularly aggression, in children aged 12 months and upwards, particularly in high risk populations. Trajectories of externalising problem behaviours are characterised by both discontinuity and continuity. Researchers have concluded a small proportion, less than 10%, of children aged two years and upwards, have persistent externalising problem behaviours across childhood (Birengen, Emde, Campos & Applebaum, 1995; Campbell, Shaw & Gilliom, 2000; Mathiesen & Sanson, 2000). These children were generally characterised by temperamental as well as familial risk including negative parenting and family stress. Other children with non persistent early emerging externalising problem behaviours either had their temperamental vulnerability buffered by a supportive rearing environment or vice versa. Thus transient problems were associated with lower risk than persistent problems.

Physical aggression has been shown to first occur around the age of 12 months (Tremblay et al., 1999). In a low risk longitudinal sample of 720 Dutch infants, average levels of CBCL externalising problem behaviours increased across toddlerhood however they remained below the borderline clinical range (Van Zeijl et al., 2006). Correlates of externalising problem behaviours were similar across 12, 24 and 36 months and included difficult temperament, authoritarian parenting style, marital discord and maternal stress. Thus externalising problem behaviours seem to come online towards the end of the first year and peak around 2-3 years as toddlers develop their autonomy and self-regulation (Tremblay et al., 2004). High stability of aggressive behaviour has been found in some young boys from two years onwards (Cummings, Iannotti, & Zahn-Waxler, 1989). Boys from age two upwards have been shown to more likely than girls to exhibit persistent externalising problem behaviours (Degnan, Calkins, Keane & Hill-Soderlund, 2008). No gender differences

however have been reported for children less than two years of age (Achenbach & Rescorla, 2000; Janson & Mathiesen, 2008).

Shaw and colleagues (Gilliom & Shaw, 2004; Owens & Shaw, 2003; Shaw, Gilliom & Giovannelli, 2000; Shaw, Gilliom, Ingoldsby & Nagin, 2003; Shaw, Owens, Giovannelli & Winslow, 2001), studied 300 boys with clinical level externalising problem behaviours (above the 90th percentile on the CBCL), from 18 months to 6 years in a low income, high risk sample. Six percent of boys had early onset and persistent externalising problem behaviours. There were only 16% of boys with late onset after age two years. Hence it was concluded externalising problem behaviours emerged early and for some children, particularly boys, can persist across infancy and preschool. Boys with high negative emotionality, fearlessness and maternal negative control were characterised by a high, non decreasing trajectory. Other predictors of externalising problem behaviours included maternal depression and rejection and marital conflict. Interactive and bidirectional effects between mother and child risk factors were not investigated.

A large US longitudinal study distinguished between five physical aggression trajectories, measured from maternal report of 5 CBCL items, in children from 2 to 8 years (NICHD & Arsenio, 2004). Most children (82%), showed low to moderate, relatively stable levels of aggression. Some children (15%) had stable, moderate levels of physical aggression. A small group of children (3%), had consistently high levels of physical aggression, 72% of these were boys. The authors noted that for most of the sample, levels of physical aggression were relatively stable from 2 to 8 years. In other words, patterns of aggressive behavior were already established by 2 years of age and were associated with early elevated risk.

Risk factor data was collected from 6 months of age and combined into composite measures at 2 years. Analyses demonstrated trajectory membership was predicted by the number of risk factors. Children with poor regulation at 4.5 years were in the moderate trajectory whereas those in the high trajectory had poor regulation plus increased family risk characterised by high SES risk, insensitive,

uninvolved mothering, including elevated maternal depression and less child-centred attitudes. The authors emphasised the importance of early mother-child interaction in understanding the etiology of different developmental pathways of problem behaviours (NICHD & Arsenio, 2004). Trajectory membership predicted multidimensional developmental outcomes at age 8 years. In particular children in the moderate and high trajectories had elevated externalising and internalising problem behaviours at age 8, in the clinical range for the high group.

Tremblay et al. (2004) reported three trajectories of physical aggression in infants from 1.5 to 3.5 years of age in a Canadian community sample. Physical aggression was measured by maternal report on 3 items: “kicks, bites or hits other children”; “gets into fights often”; “reacts with anger and fighting”. Almost a third of infants displayed almost no physical aggression (28%), about half (58%) of the infants displayed moderate and rising amounts, and a small proportion (14%) had high and rising levels of physical aggression. Risk factors present at birth such as young motherhood, history of maternal antisocial behavior, smoking during pregnancy and low maternal education predicted trajectory membership. Additional risks at 5 months included family dysfunction, coercive parenting and child difficult temperament. Boys were more likely to be in the high aggression trajectory.

Three trajectories of physical aggressive behaviour in children from age 2 years to adolescence were reported in a large, cross-sectional, Canadian population sample, (Côte, Vaillancourt, LeBlanc, Nagin & Tremblay, 2006). Children either had consistently low levels of aggression (31%), moderate decreasing levels (52%) or stable, high levels of aggression (17%). Risk factors associated with the high stable trajectory were male gender, low parent education and hostile/ineffective parenting. Children in the high trajectory also had the highest initial levels of externalising problem behaviours at age 2 years. The authors noted that physical aggression was already apparent at aged 2 years and hence future studies should investigate externalising problem behaviours in children younger than 2 years.

Degnan, Calkins, Keane and Hill-Soderlund (2008) used latent profile analysis to investigate aggressive behaviour profiles in an at risk sample of 318 American children at ages two, four and five years. Aggressive behaviour was assessed by maternal report using the aggression subscale of the CBCL. Average externalising problem behaviours were around the clinical cut off for children in the high profile at 2 years of age. These children were characterised by either high frustration reactivity and high maternal control or low physiological regulation and low maternal control. Around one third of children had moderately elevated levels of externalising problem behaviours. Children in the moderate profile had low reactivity with high maternal control or high physiological regulation with low maternal control. In other words they had less risk than the children in the high profile, either temperamental or maternal control but not both. The remainder of the sample, approximately one half, had normative and low levels of externalising problem behaviours. These children had less temperamental risk than children in the higher profiles.

The authors recommended further research investigate the transactions between temperament, emotion regulation and maternal behaviour in longitudinal patterns of problem behaviours across early childhood. They emphasised that whilst the existence of multiple externalising trajectories from age 2 upwards has been established, the prediction of membership in these trajectories remains to be clearly delineated. They concluded measures of cumulative risk and protection and may be more useful than cataloguing the many different possible combinations of predictors (Degnan, Calkins, Keane & Hill-Soderlund, 2008).

Thus current knowledge has demonstrated trajectories of externalising problem behaviours are associated with profiles of risk including difficult temperament and ineffective parenting from 12 months of age. Infant research has tended to concentrate on trajectories of externalising problem behaviours as they are presumed to develop earlier than internalising problem behaviours. The next section will discuss research relevant to understanding trajectories of internalising problem behaviours in low risk infant and toddler populations.

1.5.2 Trajectories of internalising problem behaviours

It has been thought internalising disorders may not come online until at least preschool when children have begun developing the cognitive capacities of self-evaluation and reflection. Whereas externalising behaviours peak in toddlerhood and decline over preschool, the opposite pattern has been demonstrated for internalising problem behaviours (Côte et al., 2009; Gilliom & Shaw, 2004). However high and rising depression and anxiety symptoms have been found in 15% of children aged between $1^1/_2$ and 5 years (Côte et al.). These children were characterised by difficult temperament and family dysfunction including maternal depression and lack of self-efficacy at 5 months. A further 55% of children in the sample were in the moderate and rising trajectory, leaving 30% of children with stable low levels of depression and anxiety symptoms. Thus internalising symptoms are identifiable in children as young as 18 months of age. These proportions are similar to those found in older children and adolescents (Wadsworth, Hudziak, Heath & Achenbach, 2001).

Internalising problem behaviours in children have been shown to result from interactions between vulnerable temperament and overprotective parenting (Rubin, Hastings, Stewart, Henderson & Chen, 1997). In accordance, Gilliom and Shaw (2004) found high maternal control predicted internalising problem behaviours only in boys who were fearful and negative in their high risk sample of externalising boys aged from 18 months to 6 years described earlier. Increasing internalising problem behaviours were predicted by negative emotionality. Higher levels of maternal control were associated with slower increases in internalising problem behaviours in boys who were both negative and fearful. The authors interpreted their findings as supporting the “goodness of fit” hypothesis and concluded fearful children benefitted from consistent limits set by their parents to support autonomy in new situations.

In their low income sample of over 200 young boys, Feng, Shaw and Silk (2008) described four trajectories of boys with high declining (32%), high increasing (8%), low (51%) and low increasing (9%) anxiety symptoms extracted using group-based semiparametric modeling. Initial levels of CBCL anxiety at age 2 years were predicted

by child shyness. Increases in child anxiety from 2 to 10 years were associated with maternal depression, negative maternal control and child focused attention on a frustrating stimulus. There was no effect of attachment security assessed at 18 months on initial levels or changes in anxiety symptoms across childhood. Results demonstrated the importance of temperamental vulnerability and parenting factors in the early development of internalising problem behaviours.

A latent growth curve analysis of 1364 low risk participants in the NICHD sample showed preschool inhibition and maternal anxiety predicted initial anxiety and changes in anxiety over middle childhood (Kerns, Siener & Brumariu, 2011). Attachment security was associated with decreases in anxiety. Despite the large sample size, and consistent with Brumariu and Kerns (2010), no moderation effect of behavioural inhibition on maternal anxiety was found. Thus the authors of these two studies have concluded that whilst temperamental inhibition may potentiate early anxiety, maternal and relationship factors influence change in anxiety over early to middle childhood.

Several of the studies reviewed above have demonstrated trajectories of problem behaviours in children from two years upwards are predictive of increased risk of subsequent psychopathology. However there is little current knowledge of the etiology of the early emergence of problem behaviours in children under age 2 years (Saudino, Carter, Purper-Oakil & Gorwood, 2008). Given the presumed later onset of internalising problems in children, there has been very little research in young children less than 2 years old. Further, Nottlemann and Jensen (1995) have noted that it is important to consider elevated subclinical levels across developmental stages as they may represent developmental precursors of elevated problem behaviours or clinical disorders. Studies that trace the development of problem behaviours from birth are needed to inform how potential early markers may develop and manifest as internalising problem behaviours in preschool and middle childhood.

1.5.3 The need to increase knowledge of problem behaviour trajectories across infancy in normative, community populations

With the exception of Van Zeijl et al. (2006), the studies reviewed above involved either high risk samples and/or older toddlers aged 18 months and older. There have been no reported growth trajectories of problem behaviours in infants under 18 months old and in a low risk population. The low risk studies in older children reviewed above have typically placed less than 2% of the sample in a high, clinical level trajectory, 10% in a moderate trajectory, with the remainder making up low and no symptom trajectories. Clinical levels of internalising and externalising problem behaviours using the CBCL are above the 98th percentile. In other words, 2% of children have clinical levels of internalising and externalising problem behaviours, with 7% being above the borderline clinical range.

1.5.4 Summary

The section above has described research demonstrating profiles of risk are established for both internalising and externalising problem behaviours in infants as young as 12 months old. The number of infant trajectories of problem behaviours in low risk populations could be expected to be less than in older populations, due to the relatively undifferentiated nature of infant symptom expression. Research has consistently demonstrated a small group of “at risk” toddlers, around 10%, who exhibit persistent problem behaviours that are present by the end of their first year. Increased understanding of the predictors of continuity and change in problem behaviours across infancy would inform targeted prevention and intervention programs. Risk factors of maternal depression, parenting stress and infant difficult temperament have been associated with trajectories of both internalising and externalising problem behaviours in older children and high risk populations of toddlers. These associations will be explored in greater depth in the following review chapters. Hypotheses arising from the literature discussed in this chapter that will be investigated in this study are summarised below.

1.6 Gaps in and hypotheses arising from the literature

Discussion has highlighted the relative lack of problem behaviour research in low risk infant populations. In particular little is known of the course and determinants of difficulties across infancy that may be contributing to the development of toddler internalising and externalising problem behaviours. Few studies have included separate considerations of both internalising and externalising problem behaviours to enable comparisons of common and differential etiology. Despite research demonstrating the early occurrence and detrimental outcomes of infant problem behaviours, there has been little emphasis on the assessment and identification of infants for mental health difficulties. Person-centred investigations in chapter eight will address this gap and extend the current body of knowledge on early determinants of toddler problem behaviours.

Trajectories of mothers' parenting stress and their infants' social emotional difficulty across infancy are expected to predict both internalising and externalising problem behaviours in two year old toddlers. Specifically, it is hypothesised two trajectories of mothers' parenting stress across their infants' first two years are expected in a community sample. A high risk trajectory is expected to comprise approximately 10% of the sample's mothers with consistently high levels of parenting stress from when their infants are aged 4 to 24 months of age. The remaining approximately 90% of mothers are expected to report low levels of parenting stress across infancy. Similarly, it is expected infants in a low risk community sample will form two trajectories of social emotional difficulty. The high social emotional difficulty trajectory is expected to comprise approximately 10% of infants. The remaining 90% are expected to have consistently low social emotional difficulty across infancy. It is expected mothers in the high parenting stress trajectory and infants in the high social emotional difficulty trajectory will have higher levels of both internalising and externalising problem behaviours at two years of age compared with those mothers and infants in the low trajectories.

1.7 Summary and conclusions

Infant problem behaviours have been shown to consist of both internalising and externalising behaviours in proportions similar to those of older children. The CBCL is a widely used parent report measure of toddler internalising and externalising problem behvaiours. The ASQ:SE is a relatively new parent report screening instrument designed to identify infants and young children at risk for social emotional difficulty. There is some evidence of differential pathways and risk factors contributing to the development of internalising versus externalising problem behaviours. Research has also demonstrated significant co-occurrence of internalising and externalising problem behaviours in young children as is seen in older children.

Children with early emerging and stable patterns of problem behaviours have been shown to have greater environmental and intrinsic risk. Whilst there is some knowledge about patterns of stability and change in young children from 18 months upwards (Mathiesen & Sanson, 2000), there is very little knowledge about problem behaviours in infants under eighteen months old. To date there have been no reported person centered analyses of problem behaviours in infants under 18 months in a population based sample. This would provide information on the early prevalence, trajectories and associated risk and protective factors of problem behaviours in infants.

Discussion in the next chapter will focus on mechanisms and potential risk factors affecting the development of toddler internalising versus externalising problem behaviours. Research will be presented supporting the unfolding influence of interacting maternal, child and relationship factors on toddler socioemotional development over the first two years of life.

Chapter 2

Associations between individual differences in self-regulation and stress reactivity and toddlers' internalising and externalising problem behaviours

Chapter 2: Associations between individual differences in self-regulation and stress reactivity and toddlers' internalising and externalising problem behaviours

2.1 Introduction

The previous chapter highlighted internalising and externalising problem behaviours were exhibited by some toddlers from as early as 12 months of age. Temperamental and rearing environment risk factors were shown to be associated with problem behaviours. This chapter will explore the notion that compromised self-regulation and stress reactivity may underlie toddlers' problem behaviours. Further, internalising versus externalising problem behaviours may be explained by meaningful differences in these fundamental regulatory capacities that are becoming established in the first year of life.

Self-regulation is complex and involves multiple interconnected neural structures and circuits responsible for maintaining homeostasis, regulating emotion, cognition and behaviour. It includes the inhibition of impulses and emotions in order to maintain positive relationships with others (Cozolino, 2006). Regulation also involves attentional and cognitive components such as locus of control, threat appraisal and outcome expectancies, biases in which have been associated with the development of internalising and externalising disorders (Mikulincer & Shaver, 2003; Bogels & Brechman-Toussaint, 2006). Thus emotion regulation has behavioural reactivity and physiological regulation components.

Early emerging regulation difficulties have been identified as a significant risk factor for subsequent social and emotional problem behaviours (Aksan, Kochanska & Ortmann, 2006; Calkins, Graziano & Keane, 2007; Campbell, Shaw & Gilliom, 2000; Degnan, Calkins, Keane & Hill-Soderlund, 2008; Eisenberg et al., 2010; Gunnar & Quevedo, 2007; Kagan et al., 1994; Thunstrom, 1999). Individual differences in self-

regulation and emotional and behavioural control appear to be determined both by genetic (Van Hulle, Lemery-Chalfant, & Goldsmith, 2007; Plomin, DeFries & Fulker, 1988), early developing physiological differences in emotional, arousal and cognitive styles (Gunnar, 1990; Kagan, 1994; Vondra, Shaw, Swearingen, Cohen & Owens, 2001), and in the quality of interactions between the infant and their primary caregiver (Cassidy, 1994; Thompson, Flood & Lundquist, 1995). Thus regulation difficulties are likely to result from combined genetic vulnerability and compromised rearing environment (Eisenberg et al., 2010).

Infant regulation strategies include seeking proximity or physical comfort from a caregiver, self soothing, or shifting attention away from the source of distress (Grolnick, Bridges & Connell, 1996). Attention shifting and distraction strategies have been related to lower externalising problem behaviours in children. The detrimental effects of a stressful rearing environment on multiple developing neural systems have been well documented (Cozolino, 2006; Deater-Deckard, 2004). For example, the vagal brake system has been shown to develop through positive experiences of co-regulation between caregiver and baby in the first 18 months of life (Porges, 2009). It is more subtle and sophisticated than the crude, all or nothing, fight or flight autonomic nervous systems (ANS), and operates in everyday situations that require flexible adaptive responding. Children who have had a compromised rearing environment may have an ineffective vagal brake system and be reliant chiefly on their inflexible fight or flight systems to cope with even minor stresses.

Parasympathetic ANS dominance has been associated with internalising symptoms or flight behaviour and sympathetic ANS dominance associated with externalising symptoms or fight behaviour (Cozolino, 2006; Schore, 1994). To engage in fight behaviour one must have some expectation of self-efficacy and that this is a fight they can win, whereas those who engage predominantly in flight behaviour presumably feel helpless and unable to take anyone on. It is proposed internalising and externalising problem behaviours act as a form of pressure release valve in children whose regulation systems are unable to cope with the stresses the child is experiencing. This may be due either to a highly stressful environment or to

compromised regulation systems that are ill equipped to handle life's everyday challenges. The next section discusses research demonstrating the importance of the caregiving environment, particularly for temperamentally vulnerable infants, for the development of self-regulation.

2.2 Associations between toddlers' self-regulation difficulties and compromised relationships with their caregivers

Multiple interconnected neural structures and systems including those associated with the development of emotional and behavioural regulation such as stress and fear, reward, social engagement, visual processing, mirror neurons, resonance and symbolisation become established in the first 18 months postpartum (Cozolino, 2006). Impairment in one or several of these systems could result in self-regulation deficits and the development of internalising or externalising problem behaviours. The first two years postpartum is characterised by rapid, experience-dependent developmental change and high reliance on parental responsivity (Brownwell & Kopp, 2007; Bugental, Olster & Martorell, 2003; Schore, 1994; 2001). Early emotional development occurs in the context of social interaction predominantly with the infant's primary caregiver (Eisenberg, Cumberland & Spinrad, 1998). The implications of this for the development of infants' emotion regulation are discussed next.

2.2.1 Relationships between early care and the development of infants' emotion regulation

The early primary caregiver-child relationship has been attributed a pivotal role in the development of children's interpersonal skills and capacity for emotional regulation (Bowlby, 1958; Hinde & Stevenson-Hinde, 1988; Greenspan & Lieberman, 1988; Sears, 1951). Infants develop neural structures and function through the integration of their genetic predisposition and experiences in their interactions with significant others (Cozolino, 2006; Fosha, Siegel & Solomon, 2009; Gerhardt, 2004; Schore, 2001; Sroufe, 1996). Development proceeds as modification of earlier neural structure and connectivity by differentiation and hierarchical integration (Cicchetti &

Tucker, 1994; Sroufe & Waters, 1977; Sroufe & Rutter, 1981). Thus early patterns of responding constrain future experiences resulting in increased resistance to change (Gottlieb, 1991). For example, research has demonstrated effects of early emotion regulation on subsequent coping. Moore, Cohn and Campbell (2001) reported infants' ability to manage distress at 6 months predicted their subsequent ability at 18 months. Further, in accordance with chaos theory, the effects of early compromise can be magnified along the line.

A compromised early rearing environment has been shown to have lasting effects on foundational neural structure and function (Cozolino, 2006). Hence, key developmental pathways emerge during infancy (Crockenberg & Leerkes, 2000; O'Connor, 2003). Child problem behaviours have been explained as resulting from deficits in emotion regulation, poor sense of self and low expectations of the availability and efficacy of support from compromised parent-child relationships (Bowlby, 1969, 1982; Toth, Manly & Cicchetti, 1992). For example, Gerhardt (2004) proposed babies who have not experienced effective emotional regulation may be set on developmental pathways with an impaired capacity to manage their own feelings and deal with stress. The next section highlights the caregiver's role particularly in early infancy in helping contain their infant's exposure to and management of stressful experiences.

2.2.2 The primary caregiver's role in managing their infant's stress

Infancy represents the first opportunity for the establishment of a face-to-face relationship between the developing child and their primary caregiver (Stern, 1977). Researchers have described how a baby initially relies upon their primary caregiver for behaviour and affective state management (Field, 1994; Stern, 1974; Tronick & Weinberg, 1997). In the early months caregivers effectively function as the infant's external frontal lobes, performing higher order attentional and regulatory processes on behalf of the infant whose immature cortex is not yet sufficiently developed (Cozolino, 2006). Thus the primary caregiver functions as the infant's initial stress regulator (Bogels & Brechman-Toussaint, 2006).

Infants learn to regulate their emotions through repeated experiences of co-regulation, dysregulation and reregulation with their caregivers which foster self-belief and provide adaptive scripts (Bowlby, 1973; Calkins, 1994; Cassidy, 1994; Mikulincer, Shaver & Pereg, 2003; Thompson & Meyer, 2007; Tronick & Weinberg, 1997). Children may learn suboptimal regulation strategies due to a disturbed mother-child relationship, by direct modeling or through genetic transmission of vulnerability (Caspi et al., 2004; Eisenberg, Cumberland, & Spinrad, 1998). These experiences form the foundation of the gradual development in the second year of affect regulation and attentional control, attachment schema and the self-efficacy necessary for healthy social and emotional development. The next section discusses how the caregiver's role and the mother-infant relationship change as their infant develops.

2.2.3 The impact of caregiver adaptability to their infant's changing regulation needs

From birth to two years of age, infants are making several key developmental transitions involving individuation and autonomy, the acquisition of language, the emergence of self-regulation, increased locomotion and exploration (Sroufe, 1996). It is likely that different aspects of the parent-child relationship become important at different stages of the child's development (Biringen, Emde, Campos & Applebaum, 1995; Shaw & Bell, 1993). The emotional bond between mother and baby, that is their attachment relationship, may be salient in the first 12 months as babies are learning to trust the accessibility and responsiveness of their parents to meet their primary physical and emotional needs. Thus in the first year, babies benefit from caregiving characterised by smooth routines, sensitivity, warmth and responsivity.

Around 12 months of age infants increase their exploration and caregivers function as a secure base from which to explore and to retreat in times of stress or uncertainty. During the second year, there may be tension between the toddler's striving for autonomy, increased mobility and language and the parent's supervision, limit setting and discipline strategies. Tension in the parent-toddler relationship may manifest as toddler non-compliance and aggression and increased parenting stress

(Deater-Deckard, 2004; Degnan, Calkins, Keane & Hills-Soderlund, 2008; Shaw, Winslow, Owens, Vondra, Cohn & Bell, 1998; Sroufe, 1979). Thus two year olds benefit from a rearing environment that provides firm support and clear roles and values (Sroufe, 1979).

2.2.4 Summary

This section has purported difficulties in emotion regulation and stress management underly the development of toddlers' internalising and externalising problem behaviours. In addition to temperamental predisposition, caregiver-infant interactions have been given a pivotal role in the development of infant emotion regulation in the first two years. Stress regulation is initially performed by the caregiver with a gradual increase in the infant's autonomy occurring in the second year. The following section will introduce maternal, child and relationship risk and protective factors that have been associated with the development of emotion regulation.

2.3 Risk factors associated with infants' emotion regulation development

The previous section highlighted the effect on the development of problem behaviours of compromised adjustment by child and parent to the different demands placed on their relationship during developmental transitions. Adjustment depends upon several factors. Mother and infant each bring the effects of temperament, context and prior experience to their relationship (Shaw & Bell, 1993). These child and rearing environment factors act in interaction and in multiple directions (Sameroff & Chandler, 1975; Scarr & McCartney, 1983). In addition to shared genetics, some of the mechanisms that have been proposed to affect the development of problem behaviours from the parent-child relationship include direct modeling of problem behaviours, intrinsic and extrinsic motivation, and self competence beliefs (Angold, Costello & Erkanli, 1999; Jaffee, Moffitt, Caspi, Taylor & Arseneault, 2002; Putnam & Stifter, 2005; Aksan, Kochanska & Ortmann, 2006).

Several aspects of a child's rearing environment have been shown to be risk factors for the development of problem behaviours. These include negative marital relations, lack of parental support, stress, negative affect, insecure infant attachment and difficult temperament (Zeanah, 2009). Patterns of risk and protection may vary with developmental stage. For example, the interplay between inept parenting (lack of involvement, harshness), and child noncompliance (whining and yelling), has been described by Patterson (1982, 1986) as resulting in coercive cycles of interaction starting in children from around 2 years. These coercive cycles have been found to potentiate the development of externalising problem behaviours. Less is known of patterns of risk and protection in younger children under the age of two. Further, much of the research on infant problem behaviours has concentrated on total or overall problems. There are few infant studies that have investigated separate risk profiles of internalising versus externalising problem behaviours. These will be discussed next.

2.3.1 The development of toddler internalising and externalising problem behaviours from mother, child and relationship characteristics

Belsky's (1984) determinants of parenting model attributed effects on the development of child problem behaviours from both individual and relationship characteristics. Influential characteristics of both mother and child included maternal personality and child temperament. Relationship characteristics extended beyond the mother-child relationship and included effects of the marital relationship and the mother's wider relationships with others. Further, consistent with developmental theory, interactions amongst risk factors can be expected. For example, temperamentally vulnerable infants have been shown to be differentially susceptible to a compromised mother-child relationship (Belsky & Pluess, 2009; Pluess & Belsky, 2010).

The detrimental effects of a compromised mother-child relationship on child socioemotional development have traditionally been studied in two disparate disciplines of parenting and attachment research. Parenting research has set the primary caregiver-child relationship in its socio-cultural context and adopted a social

learning approach to the consideration of the effects of aspects of the childrearing environment on child socioemotional development. Parenting stress provides a measure of the quality of the rearing environment and the mother's capacity to help her infant develop emotion regulation skills. Associations between parenting stress and toddler problem behaviours are discussed in the following section.

2.3.2 Parenting stress and the development of toddler internalising and externalising problem behaviours

There is a vast body of literature linking parenting practices and family variables such as maternal stress to child problem behaviours (Luster & Okagaki, 1993). For example parent overcontrol has been linked to internalising problem behaviours whereas parent undercontrol has been linked to externalising problem behaviours (Caspi & Silva, 1995; Oland & Shaw, 2005). Parenting research has consistently linked stress in the child's rearing environment to the development of problem behaviours in preschool children (Campbell, Pierce, March & Ewing, 1991; Deater-Deckard, 2004; McGee, Partridge, Williams & Silva, 1991). However as noted by Mathiesen and Sanson (2000), much of the research has not distinguished between internalising versus externalising problem behaviours. Stress may be a generic risk or there may be differential pathways to internalising versus externalising problem behaviours. Further, little parenting research has focused on infancy (Fagot, 1997). Chapter 3 will consider the current knowledge on the effects of parenting stress in particular on the development of internalising and externalising problem behaviours in young children. Discussion will be organised around a reconceptualisation of Belsky's (1984) determinants of parenting model.

There is evidence of common as well as specific risk profiles to internalising versus externalising problem behaviours (Rothbart & Bates, 1998; Sanson, Oberklaid, Pedlow, & Prior, 1991). Marchand, Hock and Widaman (2002), proposed internalising and externalising problem behaviours were different constructs with different etiological pathways. They suggested research move away from building a "laundry list" of risk and protective factors and towards delineating the developmental processes responsible for the development of internalising versus

externalising problem behaviours. Very little is known about how early patterns of risk unfold and how internalising versus externalising problem behaviours develop over the first two years of life. Associations between attachment dimensions of anxiety and avoidance and toddler internalising and externalising problem behaviours may shed light on differential developmental mechanisms. These associations are discussed briefly in the next section and in more detail in Chapter five.

2.3.3 Associations between dimensions of mother-infant attachment anxiety and avoidance and the development of toddler internalising and externalising problem behaviours

Attachment theory adopts an ethological, biological systems understanding of socialisation, emotion regulation and personality development and attributes substantial effects of early child-caregiver relationships on other social relationships across the lifespan (Bretherton & Waters, 1985; Hinde & Stevenson-Hinde, 1988; Sroufe & Waters, 1977). Early cognitive representations of the primary attachment relationship is presumed to be related to homeostatic representations of self and other that serve as prototypes for later relationships. Consequently, attachment researchers have stressed the first twelve months as the "sensitive period" for the development of attachment and hence, there is a substantial body of infant attachment research (Bowlby, 1969; Ainsworth, Blehar, Waters & Wall, 1978; Erickson, Sroufe & Egeland, 1985).

Conclusions from attachment research however have generally been limited to distinguishing between securely and insecurely attached children. The development of internalising versus externalising problem behaviours in infancy from dimensions underlying attachment security and insecurity has received very little attention. Chapter four will explore associations between maternal and infant attachment anxiety and avoidance. Chapter five will then consider the current knowledge on the effects of attachment anxiety and avoidance on the development of internalising and externalising problem behaviours in young children. The following section will

highlight gaps in the parenting and attachment bodies of knowledge of the development of toddler internalising and externalising problem behaviours.

2.3.4 Gaps in the research predicting toddler internalising and externalising problem behaviours

Greenberg, Speltz and DeKlyen (1993) noted the paucity of studies of child adjustment that focused on infancy and advocated multidisciplinary research across domains of attachment, parenting, family ecology and individual characteristics (parent and child), in order to increase knowledge of the development of infant adjustment. The prediction of infant problem behaviours from both parenting and attachment variables has been limited firstly by inadequate research designs that have not satisfactorily captured the complexity of human development and secondly, by a lack of integration, both empirically and theoretically, across the disparate parenting and attachment bodies of literature.

This study aims to improve current understanding of the development of toddler internalising and externalising problem behaviours in the general population by addressing some of these limitations through the integration of maternal, child and attachment variables and by adopting a transactional relationship perspective to development (Hinde & Stevenson-Hinde, 1988). Central to the mother-infant relationship is the effect of the infant's temperament. The last section of this chapter outlines the notion of differential susceptibility to rearing environment risk by temperamentally vulnerable infants.

2.3.5 Are some infants more susceptible to rearing environment risk?

Children have been shown to differ in their sensitivity and susceptibility to risk factors present in their rearing environment (Belsky, 1997; Belsky & Pluess, 2009). Although there have been mixed findings, some studies have suggested boys are more susceptible to rearing environment risk factors, such as parenting stress, than girls (Obradovic & Boyce, 2009; Shaw et al., 1998). Around 20% of children are estimated to be highly sensitive to their environment (Aron & Aron, 1997). Campbell, Gilliom and Shaw (2000) described differential susceptibility as interactions between

vulnerable temperament and relationship factors. Moffitt (1993) has attributed differential susceptibility to shared genetics and compromised parenting. This is consistent with interactions between temperament, family ecology and infant attachment proposed in Greenberg's ecological risk factor model (DeKlyen & Greenberg, 2008; Greenberg, Speltz & DeKlyen, 1993).

Several studies have reported findings supporting children's differential susceptibility to risks in their rearing environment. Belsky, Jaffee, Sligo, Woodward and Silva (2005) noted children with a difficult temperament seemed to be the most affected by aspects of their rearing environment. Belsky, Hsieh and Crnic (1998) found infants who were distressed in the Strange Situation were more affected by parenting and displayed more externalising problem behaviours at age 3. Further, two year olds with high negative emotionality have been shown to be more susceptible to the detrimental effects of maternal depression on the development and maintenance of externalising problem behaviours (Owens & Shaw, 2003).

In contrast, children with less temperamental reactivity have been shown to be less affected by their rearing environment (Hane & Fox, 2007). Van Zeijl et al. (2007) reported differential susceptibility to parental discipline, both positive and negative, by temperamentally difficult toddlers aged 1 to 3 years. Similarly, in a longitudinal field study of 1364 babies aged from 1 month to 11 months, temperamentally difficult babies were found to be more susceptible to both negative and positive rearing risk factors (Belsky & Pluess, 2009). The authors concluded that although infants with difficult temperaments were more easily overwhelmed by stress, they also benefitted more from a positive environment. This has implications for designing and implementing interventions to improve infant outcomes.

Belsky and Pluess (2009) concluded aspects of negative emotionality, such as fear, wariness and inhibition, make a child more sensitive to context and more prone to internalising problem behaviours. Oland and Shaw (2005) observed variation in a child's strategy to deal with stress is manifested as either internalising problem behaviours by children with an avoidant coping style or as externalising problem

behaviours by children with an aggressive coping style. Whether problem behaviours manifest as internalising, externalising or both, they may be determined by the interaction between the child's temperament and the quality of their relationship with their primary caregiver. This study will focus on two factors that reflect relationship quality discussed above, namely parenting stress and attachment.

2.3.6 Summary

Aspects of the infant's rearing environment that compromise their development of emotion regulation and increase their stress reactivity have been purported to be associated with the development of toddler internalising and externalising problem behaviours. Parenting stress has been viewed as a general risk factor reflecting a compromised rearing environment. Attachment anxiety and avoidance have been introduced as factors that may delineate differential pathways to internalising versus externalising problem behaviours. Infants with vulnerable temperaments have been shown to be more prone to negative effects of rearing environment risk than temperamentally easier infants and exhibit more internalising and externalising problem behaviours. Thus toddler problem behaviours have been described as resulting from interactions from mother, child and relationship risk factors.

2.4 Gaps in and hypotheses arising from the literature

Discussion in this chapter has suggested there is marginal integration across the largely disparate bodies of parenting and attachment literature. This study will address this gap by incorporating both parenting and attachment measures in a single study. The lack of attention to delineating specific risk factors to internalising versus externalising problem behaviours particularly in low risk infant populations was highlighted as a significant gap in the literature. It was hypothesised both parenting stress and infant difficult temperament were generic risk factors that would be associated with both internalising and externalising problem behaviours. These hypotheses will be investigated in chapter seven. The mother-infant attachment relationship was introduced as a regulatory construct that may be expected to be important in the development of toddler problem behaviours. Past

research reliance on a dichotomous secure/insecure conceptualisation of attachment was highlighted as a significant gap that prevented investigation of more specific hypotheses related to different insecure strategies. This will be discussed further in Chapters four and five where specific hypotheses will be formulated.

2.4 Summary and conclusions

Problem behaviours have been associated with emotion regulation difficulties manifesting in response to environmental stressors. The discussion above highlighted how infants develop emotion regulation and stress reactivity in their first two years through their close interactions with their caregivers. Both individual characteristics of mother and child and mother-infant relationship quality have been implicated. The literature points to key influential interacting constructs such as parenting stress, maternal and infant attachment and infant difficult temperament. Associations between these and toddler internalising and externalising problem behaviours will be explored in greater detail in Chapters three, four and five.

Chapter three explores the effect of maternal stress on the mother-child relationship and the development of infant problem behaviours. Chapter four considers existing knowledge on the associations between maternal attachment, the mother-infant attachment relationship and the development of infant problem behaviours. Recent integrated research combining these traditionally separate research paradigms is presented in Chapter five.

The primary aim of this study is to model the development of internalising and externalising problem behaviours in two year old infants from unfolding interactions amongst risk factors of difficult infant temperament, maternal stress and maternal and infant attachment across the first two years of life. The longitudinal fusion of parenting stress and attachment effects, traditionally considered in separate paradigms, in the general population, will add to the body of knowledge on the development of infant mental health difficulties. Differential susceptibility of temperamentally vulnerable infants to the effects of maternal stress and mother-infant attachment will be incorporated in the investigations.

Ideally a developmental cascades model would capture the co-development of risk factors such as infant difficult temperament, parenting stress, and relationships such as marital relations and mother-infant attachment, and infant problem behaviours across the first two years postpartum (Eisenberg et al., 2010; Sameroff & McKenzie, 2003; Masten, 2005). However such an integrated model would require a very large sample. This study will adopt a more pragmatic approach and examine sections of the developmental cascade model separately in the empirical chapters six, seven and eight.

Chapter six presents the prediction of mothers' parenting stress at 12 months from infant temperament, and maternal attachment at 4 months, and infant attachment anxiety and avoidance at 12 months. Chapter seven presents the effects of early individual and relationship risk factors and concurrent maternal stress on toddler problem behaviours at 24 months. Person-centred investigations of the development, stability and prediction of maternal stress and socioemotional adjustment difficulties in infants at 4, 12 and 24 months are presented in Chapter eight. The implications of the investigations presented in chapters six to eight for increasing understanding of the etiology of infant problem behaviours and improving children's mental health will be discussed in chapter nine.

Chapter 3

Relationship, maternal and child influences on the development of infant problem behaviours: Looking through a parenting stress lens

"If a community values its children it must cherish their parents"

(Bowlby, 1951)

Chapter 3: Relationship, maternal and child influences on the development of infant problem behaviours: Looking through a parenting stress lens

The birth of a child has been well documented as a particularly stressful time in the marital relationship (Cowan & Cowan, 1995; Deater-Deckard, 2004; Miller & Sollie, 1980). The previous chapter emphasised difficulties in the development of infants' self-regulatory skills are manifested as problem behaviours and that infants develop self regulation through their relationships with their primary caregivers. This chapter will discuss parenting research that has contributed to our current understanding of the development of parenting stress and its association with infant internalising and externalising problem behaviours. Belsky's (1984) model of the determinants of parenting and infant development will be used to organise the discussion of current understanding of the effects of individual differences in maternal, child and relationship factors on maternal stress, the mother-infant relationship and the development of infant problem behaviours. Relationship factors include the mother's relationship with her child as well as other important relationships such as with her own parents and with her spouse.

3.1 Relationship between maternal coping ability, stress and children's problem behaviours

Children's mental health difficulties have been described as resulting from an interaction between genetic predisposition and exposure to environmental stressors (Caspi et al., 2003; Eisenberg & Valiente, 2004; Fox, Henderson, Marshall, Nichols & Ghera, 2005; National Scientific Council on the Developing Child, 2008). The disruptive, dysregulating effects of excessive stress on brain development, stress reactivity and relations with problem behaviours have been well documented (Cummings, Davies & Campbell, 2000; National Scientific Council on the Developing Child, 2005). Stress has been defined as a state when a person's available coping resources, including their appraisal and regulation systems, are unable to cope with

experienced demands (Jewitt, 1997; Lazarus, 1991; Power, 2004). Coping strategies may involve avoidance or vigilance, with individual differences reflecting susceptibility to increased arousal or uncertainty respectively (Krohne, 1993; Suls & Fletcher, 1985).

As discussed in the previous chapter, regulation during infancy occurs primarily through physiological arousal or co-regulation with the primary caregiver (Gianino & Tronick, 1998; Kopp, 1989). Infant regulation strategies include active distraction by shifting attention, passive waiting and seeking comfort from their primary caregiver (Williford, Calkins & Keane, 2007). Higher order strategies come online towards the end of the second year (Calkins & House, 2004). Kopp has described how infants regulate their stress by redeploying their attention either by distraction, turning away or habituation. Infant ability to manage distress in the still face procedure at 6 months has been shown to predict ability to manage distress at 18 months in a low risk sample (Moore, Cohn & Campbell, 2001). Infants who displayed less positive affect and did not smile in an attempt to re-engage their mother's attention displayed more externalising problem behaviours at 18 months. Infants who did not cry in the still face procedure displayed less internalising problem behaviours at 18 months. Further, inflexibility in shifting attention from a stressor to regulate distress has been shown to be associated with childhood anxiety (Grolnick, Bridges & Connell, 1996).

Problem behaviours have been viewed as reflecting an inability to cope adaptively with stressors (Compas, Connor-Smith, Saltzman, Thomsen & Wadsworth, 2001). For example, compared with non-affected children, children with externalising problem behaviours have been shown to have lower thresholds for stress reactivity (Snoek, van Goozen, Matthys, Buttelaar & van Egeland, 2004). Evidence supports an environmental contribution to the development of children's stress reactivity. Mothers' parenting stress, described in the next section, is an important risk factor that has been associated with decreased capacity in their children to manage stress resulting in internalising and externalising problem behaviours.

3.2 What is parenting stress?

Parenting stress has been defined as "a set of processes that lead to aversive psychological and physiological reactions arising from attempts to adapt to the demands of parenthood" (Deater-Deckard, 2004). Parenting stress is thus a measure of parents' subjective distress. Aversive reactions include negative feelings and beliefs toward the self and the child. Abidin (1995) has described parenting stress as stress in the parent-child system which has been shown to be a critical factor in the development of problem behaviours in children in the first three years (Carter, Briggs-Gowan & Ornstein Davis, 2004; Deater-Deckard, 2004). Aspects of parenting stress include stress arising from parent characteristics and family context (parent domain), child characteristics and the parent-child relationship (child domain), and life events (Abidin; Crnic & Acevedo, 1995; Crnic & Low, 2002; Mash & Johnston, 1990). Parenting stress may be an organisational construct that represents the net effect of multiple interacting factors. Proposed influential factors will be incorporated into a parenting stress and child adjustment model in the next section.

3.3 A model of the determinants of parenting stress and child adjustment

Consistent with a socioecological approach, Belsky (1984) proposed a parenting model incorporating multiple determinants of parenting and parenting as the primary determinant of child development and adjustment. According to Belsky's model, determinants such as parental personality and psychopathology, marital relations, child characteristics and social network influences directly affected parenting. The parent's own developmental history had indirect effects on parenting via parent personality and current relationships. In addition, the parenting model included substantial feedback and interaction amongst concurrent parenting influences. Whilst this study acknowledges Bronfenbrenner's (1979) distal system sources of stress and parenting influences from the workplace, wider societal norms and culture, this study's focus is on microsystem influences from the mother, child and parent-child relationship.

Belsky's (1984) model can be reconceptualised from a relationship perspective, in terms of the effects on the mother-infant relationship and infant development from her relationships with others, including her relationship with herself, spouse, social network, and her own parents as her developmental history. Other researchers have expanded Belsky's parenting model to include the parent's emotional well-being, parenting stress and life stress as determinants of parenting (Abidin, 1990; Abidin, Jenkins & McCaughey, 1992; Simons & Johnson, 1996). Parenting stress may include stress due to personal characteristics, stress from relationships with others such as with the mother's partner or her own parents, as well as from relational difficulties with her own child. There are currently no theoretical models regarding the interactions amongst these stressors in determining overall parenting stress (Östburg & Hagekull, 2000).

It is proposed Belsky's parenting model can be further reconceptualised as a parenting stress model. The determinants reflect both a mother's self-regulation and coping capacity, and the amount of stress she has to manage. A mother's stress reactivity and regulation is a function of interactions between her genetic predisposition and formational childhood and current interpersonal experiences (Rothbart, Ahadi & Evans, 2000). Family stress theory posits a mother's personal resources are central to her experience of parenting stress (McGubbin, Sussman & Patterson, 1983). Thus, determinants of parenting can be reconceptualised as determinants of parenting stress. Determinants include factors that reduce a mother's appraisal and regulation resources to adaptively cope with parenting stressors and maintain an adaptive relationship with her child.

Coping with stress requires access to a range of emotions and flexibility of responding using multiple strategies (Skinner & Zimmer-Gembeck, 2007). Coping skills can be characterised as involving predominantly avoidance versus approach and involve problem-focused or emotion focused strategies (Billings and Moos, 1982; Krohne, 1993; Suls & Fletcher, 1985). Avoidant strategies have been associated with parenting stress and psychological maladjustment (McKelvey, Fitsgerald, Schiffman & Von Eye, 2002; Perlin & Schooler, 1978). Approach strategies may

involve cognitive reframing or relationship-focused coping through support seeking and gaining emotional support from others which may buffer the effects of parenting stress on parent-child interaction (Crnic & Greenberg, 1990; Crnic & Acevedo, 1995; Weinraub & Rolf, 1983). However over-reliance on others for coping may be associated with dependency and negative self-belief and increased parenting stress. Problem-focused, approach strategies require the parent to feel they have some control, and thus are less likely to occur in mothers with elevated levels of attachment preoccupation.

Dysregulated mothers who either minimise or maximise feelings, such as those exhibiting elevated attachment anxiety or avoidance, are less likely to use emotion-focused coping strategies to manage their stress. Thus dysregulated mothers can be expected to have higher levels of parenting stress. Parenting stress is proposed to affect a mother's ability to provide supportive parenting in the face of challenges which is expected to be associated with toddler internalising and externalising problem behaviours (Deater-Deckard, 2005; Gunnar & Quevedo, 2007). Associations between parenting stress and toddler problem behaviours are explored in the following section.

3.4 Associations between parenting stress and the development of toddler problem behaviours

There is a large body of knowledge linking contextual stress and child maladjustment (Abidin, Jenkins & McGaughey, 1992; Crnic & Low, 2002; Deater-Deckard, 2004; Morgan, Robinson & Aldridge, 2002). Maternal stress is proposed to affect the emotional climate of the home and have disruptive effects on the mother-infant relationship compromising a mother's ability to regulate herself, her infant and foster her infant's development of self-regulation (Deater-Deckard; Simons & Johnson, 1996). The infant of a stressed mother is likely to experience states of either over or underarousal and be left to deal with them predominantly on their own. Maladaptive strategies such as internalising and externalising problem behaviours are more likely to result in toddlers of stressed mothers (Eisenberg,

Cumberland & Spinrad, 1998). Power (2004) recommended the consideration of the effects of parenting stress on the development of children's regulation and coping skills.

As introduced in the previous chapter, research has demonstrated the quality of early care is a key determinant of a child's developing stress reactivity and coping skills (Boyce & Ellis, 2005; Essex, Klein, Cho & Kalin, 2002; Gunnar & Cheatham, 2003; Gunnar & Quevedo, 2007; Hane & Fox, 2006; Repetti, Taylor & Seeman, 2002). Parents can be either a source of stress and emotional insecurity or support and security to their infants (Cummings, 1994; Dumas & LaFreniere, 1993). There is a substantial body of knowledge linking parenting stress and the development of problem behaviours in older children (Deater-Deckard, 2004; Essex et al., 2006; Mantymaa et al., 2006). However, there is very little research on the effects of parenting stress on infants.

Parenting stress has been shown to be associated with children's internalising and externalising problem behaviours in children from around 18 months of age (Abidin, Jenkins & McGaughey, 1992; Anthony et al., 2005; Bayer, Hiscock, Ukoumunne, Price & Wake, 2008; Campbell, Pierce, Moore, Marakovitz & Newby, 1996; Costa, Weems, Pellerin & Dalton, 2006; Mathiesen & Sanson, 2008; Morgan, Robinson & Aldridge, 2002; Yates, Obradovic & Egeland, 2007). Abidin (1995) observed dysfunctional parenting, resulting from the inability to deal with perceived stresses, was associated with child maladjustment. Parenting stress, spouse support and marital adjustment explained 46% of the variance in total child adjustment (aged 4-5 years) for boys, compared with 21% for girls. Parenting stress effect sizes are smaller in low risk samples (Deater-Deckard & Scarr, 1996).

Less is known about the relations between parenting stress and problem behaviours in infants and toddlers. Parenting stress was associated with concurrent externalising and total problem behaviours in a small, low risk sample of mothers and their two year old toddlers (Creasey & Jarvis, 1994). Williford, Calkins and Keane (2007) also demonstrated a close relation between parenting stress and child

externalising problem behaviours using hierarchical linear modeling in an elevated risk sample of children aged 2 to 5 years. Familial stress has been shown to have detrimental effects on the development of infant's stress-responsivity, emotion processing and social competence as indicated by internalising and externalising problem behaviours (Essex, Klein, Cho & Kalin, 2002; Heim & Nemeroff, 1999; Repetti, Taylor & Seeman, 2002). However no specific predictions have been made regarding relations between familial stress and internalising versus externalising problem behaviours.

In a study of low risk infants, Van Zeijl et al. (2006), reported moderate to large effects of concurrent difficult child temperament (r=.66) and maternal stress (r=.42) on CBCL externalising problem behaviours at 24 months. Small effect sizes were reported for the associations between toddler externalising problem behaviours with marital discord, social support and maternal well being. This is in accordance with the lesser role of more distal factors in Belsky's (1984) determinants of parenting and child development model. The authors assessed concurrent associations only and did not make any predictions from their longitudinal data about the interactive effects of prior adaptation and risk on subsequent externalising problem behaviours. Effects of maternal, infant and relationship constructs on the development of both parenting stress and toddler internalising and externalising problem behaviours will be discussed in the following sections.

3.5 Associations between maternal sources of parenting stress and toddler internalising and externalising problem behaviours

3.5.1 Maternal sources of toddler problem behaviours

The literature has demonstrated relations between parenting and child adjustment to stress (Power, 2004). Parents affect the stressors children experience, the child's appraisal of a potential stressor and their behavioural response to a stressor. This is particularly relevant in infancy when the infant looks to the parent for appraisal and coping strategies (Eisenberg et al., 2010; Kemppinenm,

Kumpulainen, Raita-Hasu, Moilanen & Ebeling, 2006). Various aspects of parental personality and behaviour have been reported to have direct and indirect effects on toddler behaviour via their effects on the child's exposure and responses to stressors. Parenting risk factors such as low SES, single parenthood, maternal psychopathology, especially depression, stress and marital conflict, have been both directly, and indirectly via their effects on parenting, related to disruptive problem behaviours in early childhood (Bagner, Pettit, Lewinsohn & Seeley, 2010; Greenberg, Speltz & DeKlyen, 1993; Power, 2004).

In a meta-analysis of 47 studies involving children aged from 10 months to adolescence, Rothbaum and Weisz (1994) found two orthogonal factors, negative caregiving/ lack of parental acceptance-responsiveness and restrictiveness, explained a substantial portion of the variance in externalising problem behaviours with a moderate effect size. Recent studies support these findings. For example, rejecting, negative parenting has been associated with toddlers' externalising behaviour (Brook, Zheng, Whiteman & Brook, 2001; Campbell, 1994; DeKlyen, Speltz & Greenberg, 1998; Kuczynski, 2003; Nix, Pinderhughes, Dodge, Bates, Petit & McFayden-Ketchum, 1999; Rubin & Burgess, 2002). Internalising behaviours have been associated with inconsistent, overcontrolling, intrusive or overprotective mothering which encourages and prolongs infant dependency and precludes mastery experiences and infant autonomy (Cassidy & Berlin, 1994; Rubin, Burgess & Hastings, 2002; Thomasgard & Metz, 1999).

Carter, Briggs-Gowan, and Davis (2004) reported maternal feelings of parenting inefficacy were also associated with externalising problem behaviours in young children. Negative maternal behaviours and mother-child interaction have been found to account for the relation between maternal depression and child externalising problem behaviours (Harnish, Dodge & Valiente, 1995). Further maternal depression and rejecting parenting were associated with the development of externalising problem behaviours in infant boys aged 18 months and 2 years in a high risk, low income sample (Shaw, Owens, Giovannelli & Winslow, 2001). In an elevated risk sample of 78 children aged 4-7 years, the association between maternal

depression and internalising problem behaviours has been shown to be moderated by child emotion regulation (Silk, Shaw, Forbes, Lane & Kovacs, 2006).

A large body of literature has linked maternal depression and anxiety with child internalising and externalising problem behaviours (de Rosnay, Cooper, Tsigara, & Murray, 2006; Gartstein & Sheeber, 2004; Gartstein & Bateman, 2008; Lovejoy, Graczyk, O'Hare & Neuman, 2000; Meadows, McLanahan & Brooks-Gunn, 2007; Najman et al., 2000; Trapolini, McMahon & Ungerer, 2007). Infants of depressed mothers have been shown to cope either by withdrawing to avoid conflict and negativity, or by approaching and demanding attention and responsivity. For example subclinical levels of maternal depression predicted increases in infant fearfulness between 4 and 10 months in a low risk sample which predicted 20% of the variance in internalising problem behaviours in 2 year olds (Gartstein et al., 2010). Thus maternal depression has been established as a generic predictor of toddler problem behaviours with no specific pathways to internalising versus externalising problem behaviours.

Recent adoption research has demonstrated parenting effects of maternal depression over and above genetic effects (Pemberton, et al., 2010). Parenting by depressed mothers has been shown to be characterised by increased negative affectivity such as irritability and hostility, less responsivity and communication, and helplessness (Feng, Shaw, Skuban & Lane, 2007; Lovejoy, Graczyk, O'Hare & Neuman). These studies have also demonstrated moderation of the effects of maternal depression on children's development by partner support. Many of the studies have used self-report measures of depression. Whilst the validity of these has been questioned, recent studies have supported their use (Gartstein, Bridgett, Dishion & Kaufman, 2009; Solomon, Haaga, & Arnow, 2001). Given postnatal depression prevalence is higher than the general population adult depression prevalence of around 10%, maternal depressive symptomatology is likely to play a significant role in the development of toddler internalising and externalising problem behaviours (Buist et al., 2008; Lindeman et al, 2000).

Discussion above has highlighted direct associations between aspects of maternal relationships and characteristics such as affect regulation and depression, on child internalising and externalising problem behaviours. According to the reconceptualised determinants of parenting and child adjustment model, it is proposed these effects may be mediated by their contribution to mothers' parenting stress. These are outlined in the following section.

3.5.2 Maternal sources of parenting stress

Maternal resources such as personality, psychopathology, especially depression, marital relations, social support, and health and emotional well being, have been shown to impact both parental competence and parenting stress (Abidin, 1990; Deater-Deckard, 2004). Belsky (1984) proposed maternal psychological resources were a major factor determining parenting and child development due to their pervasive influence in all interpersonal interactions. The disruptive effects of maternal depression and other maternal psychopathology on parenting stress and mother-infant interactions have been well documented (Carter et al., 2001; Field, 2002; Gelfand, Teti & Fox, 1992; Sheinkopf et al., 2006; Tronick & Weinberg, 1997; Williford, Calkins & Keane, 2007).

Östberg & Hagekull (2000) found high workload, low support, perception of the child as fussy or difficult, negative life events, larger family and maternal age predicted the parent domain of concurrent parenting stress in a large sample of Swedish mothers of infants aged from 6 months to 3 years. Mulsow, Caldera, Pursley, Reifman & Huston (2002) found maternal personality was the strongest predictor of parenting stress across infancy. Child temperament and partner support were also found to be important at 1 and 36 months. The authors of this study found no effect of infant gender on parenting stress across the first three years postpartum.

3.5.3 Summary

Aspects of maternal personality, particularly those affecting self-regulation, have been shown to be important determinants of both parenting stress and toddler internalising and externalising problem behaviours. These include anxiety and depressive symptomatology. Parenting stress may mediate and/or moderate the effects of maternal personality and marital relations on toddler problem behaviours. There has been little empirical research on the effects of parenting stress on the development of problem behaviours in low risk infant populations. There has been relatively more research linking infant temperament to the development of internalising and externalising problem behaviours and parenting stress. This is discussed in the next section.

3.6 Relations between infant characteristics and parenting stress and toddler internalising and externalising problem behaviours

3.6.1 Associations between infant characteristics and the development of toddler internalising and externalising problem behaviours

Temperament theorists view individuals as having endogenous, biologically based traits that underlie reactivity and regulation. These traits appear early and are relatively stable but can be modified through interaction with the environment (Rothbart & Bates, 1998; Sanson, Prior, Garino, Oberklaid & Sewell, 1987). Thus temperament has been shown to be determined both by genetic and environmental factors (Saudino, Purper-Ouakil, Gorwood & Carter, 2008). Aspects such as low effortful control, inadaptability, persistence, negative mood, and negative emotionality have been demonstrated in infants less than 6 months of age and implicated in social functioning and the development of internalising and externalising problem behaviours (for a review see Sanson, Hemphill & Smart, 2004).

For example, Sanson and Prior (1999) found negative reactivity and high activity were associated with externalising problem behaviours in children aged 2 to 6 years. In contrast, others have found toddlers characterised by high negativity, low approach, and high inhibition, were highest in internalising problem behaviours (Putnam & Stifter, 2005; Janson & Mathiesen, 2008). Reactivity to novelty has also been associated with internalising problem behaviours (Fox, Henderson, Rubin, Calkins & Schmidt, 2001), whereas reactivity to frustration has been associated with externalising problem behaviours (Calkins, 2002; Shaw, Lacourse & Nagin, 2005). Recent research has demonstrated associations between early childhood attentional problems and fussiness in the first year and subsequent externalising problem behaviours as toddlers (Crockenberg, Leerkes & Barrig Jo, 2008; Leve et al., 2010; Pemberton et al., 2010). Toddlers high in shyness and emotionality were high on both externalising and internalising problem behaviours (Janson & Mathiesen, 2008).

Externalising problem behaviours are more associated with boys and internalising problem behvaiours with girls in older children (Achenbach & Rescorla, 2000). There have been equivocal findings however with respect to gender effects on parenting and internalising versus externalising problem behaviours in children under age 3 years (Saudino, Carter, Purper-Oakil & Gorwood, 2008; van den Oord, Verhulst & Boomsma, 1996). Parke (1976) observed there were differential parental expectations, attitudes and reactions to male versus female babies. In a low risk sample, Braungart-Rieker, Courtney and Garwood (1999), reported infant gender moderated the effects of maternal sensitivity and marital adjustment on infant emotionality. Other studies however have not reported infant gender effects on parenting or infant adjustment (Belsky, 1984).

3.6.2 Infant sources of parenting stress

Some children are more difficult to care for than others and are more likely to contribute to parenting stress (Deater-Deckard, 2004). Aspects of difficult temperament such as infant sleep difficulties, eating difficulties and persistent crying have consistently been associated with maternal stress (Abidin, 1990; Deater-Deckard, 2004; Lindberg, Bohlin, Hagekull & Thunstrom, 1994; Östberg, Hagekull &

Hagelin, 2007; Owens & Shaw, 2003). From around 2 years of age, reactive, inattentive and dysregulated children, such as those with internalising and externalising problem behaviours, have been shown to have parents who report higher levels of parenting stress (Briggs-Gowan, Carter, Skuban & Horowitz, 2001; Calkins & Dedmon, 2002; Williford, Calkins & Keane, 2007). Recently this has also been shown to be the case for parents of irritable, reactive infants less than 12 months of age (Bridgett et al., 2009). However, research illustrating normal development by difficult and compromised infants has suggested child difficult temperament has relatively less influence than maternal sources on maternal stress and infant development (Belsky, 1984).

Mothers' expectations and appraisal of their child's behaviour has also been shown to be important in determining levels of parenting stress (Deater-Deckard, 2004). Research has demonstrated parents tend to underestimate the social emotional abilities of their babies in the first year postpartum and overestimate the regulation abilities of their toddlers (Zero to Three, 1997). Increased parenting stress could be expected to result from a child's failure to meet their parents' expectations. According to Deater-Deckard, a lack of child development knowledge, cognitive biases and ineffective parenting strategies arising from a mother's own experience as of being parented as a child have been shown to affect parenting stress. Child characteristics that have been associated with parenting stress include parent perceptions of child adaptability, acceptability, demandingness, mood, and hyperactivity/distractibility (Abidin, 1990). The next section explores the validity of maternal report versus observational measures of child temperament.

3.6.3 Measuring child temperament

Temperament research has adopted both observational and maternal report measures. Maternal reports of infant temperament have been shown to be associated with SES, maternal personality, prenatal childrearing attitudes and postnatal parenting behaviour (Austin, Hadzi-Pavlovic, Leader, Saint, & Parker, 2005; Rubin, Nelson, Hastings & Asendorpf, 1999). For example, maternal perception of difficult temperament has been related to reduced maternal stimulation and

responsiveness (Priel & Besser, 2000). Whilst there has been some criticism of the use of maternal report to measure infant temperament, its validity has also been supported (Rothbart & Hwang, 2002). Mothers represent an expert perspective on pervasive aspects of their infant's behaviour across a variety of contexts that cannot be substituted by a single laboratory observation in a restricted context.

3.6.4 Summary

Aspects of infant difficult temperament, particularly those affecting self-regulation, have been shown to be important determinants of both parenting stress and toddler internalising and externalising problem behaviours. Specific aspects of temperament have been associated with internalising versus externalising problem behaviours. There is evidence for early caregiving effects on the development of infant's stress reactivity and self-regulation. Parenting stress may mediate and/or moderate the effects of infant temperament on toddler problem behaviours. Maternal reported child temperament has been shown to be a valid, global temperament measure and related to parenting behaviour.

Discussion so far has concentrated on unique contributions from mother and child to the development of toddler problem behaviours. As has been emphasised throughout, behaviour occurs within the context of one's close relationships. The next section will explore associations between key relationships both on mothers' parenting stress and on the development of toddler internalising and externalising problem behaviours.

3.7 Relationship effects on parenting stress and the development of toddler problem behaviours

3.7.1 Relationship sources of parenting stress

Belsky (1984) described the marital relationship as a major source of stress or support that influenced parenting and child development. Positive and negative marital relations have demonstrated direct effects on parenting stress, the parent-child relationship and child outcomes in low and high risk populations (Belsky, Rovine

& Fish, 1989; Belsky, Youngblade, Rovine & Volling, 1991; Crnic & Low, 2002; Cummings & Davies, 1994; Dadds & Powell, 1991; Deater-Deckard, 2004; Holden & Ritchie, 1998; Suarez & Baker, 1997). However research has also shown mothers' parenting stress is less affected by marital conflict than fathers' and is more closely associated with child attributes. It has been suggested mothers may be more likely to be drawn closer to their children as result of stress and conflict in their relationship with their partner (Deater-Deckard, 2004).

The mother-child relationship is also a source of parenting stress (Abidin, 1995). Dumas and LaFreniere (1993) demonstrated mothers of difficult children interacted normally with unfamiliar children but negatively with their own. The findings were not explained by individual characteristics such as maternal personality or child temperament. In Chapter four infant attachment will be conceptualised as representing a key feature of the mother-infant relationship. Similarly, maternal attachment will be conceptualised as representing a mother's state of mind with respect to her childhood relationship with her own parents. Associations between infant and maternal attachment with parenting stress will be considered in Chapter four. Consistent with a relationship perspective, the current study highlights the importance of considering relational influences at the level of the mother-infant dyad on parenting stress and child behaviour.

3.7.2 Relationship effects on the development of toddler problem behaviours

There is a substantial body of literature linking various marital constructs such as marital conflict, marital satisfaction and marital quality, to parenting and infant adjustment. Erel and Burman's (1995) meta-analysis of 68 studies reported a moderate effect size for the relation between marital relations and parent-child relations. More recently, Krishnakumar and Buehler's (2000) meta-analysis of the effects of marital conflict on parenting concluded a large effect size between negative marital relations and harsh parenting characterised by a lack of acceptance. Marital conflict can be viewed as a stressor that affects the child's sense of emotional security (Davies & Cummings, 1994; Emery & O'Leary, 1984). There is a

substantial body of research linking negative marital relations to child problem behaviours (Grych & Fincham, 1990; Repetti, Taylor & Seeman, 2002).

Some researchers have highlighted the unique contributions of positive versus negative marital relations on the mother-child relationship and child problem behaviours (Belsky, Jaffee, Sligo, Woodward & Silva, 2005; Fincham & Linfield, 1997). For example, Miller, Cowan, Cowan, Hetherington and Clingempeel (1993) reported fewer externalising problems with greater marital positive affect. Parent characteristics, such as depression, were shown to exert their influence indirectly on the development of preschoolers' externalising problem behaviours via effects on their marital relationship and parent-child relationship. Positive marital relations have been shown to buffer the effects of difficult temperament on parenting behaviour (Schoppe-Sullivan, Mangesldorf, Brown & Sokolowski, 2007). Simons and Johnson (1996) emphasised spouse support over other aspects of the marital relationship in determining parenting quality. Reciprocal effects of child problem behaviours increasing marital conflict have also been demonstrated (Johnston & Mash, 2001).

Whilst discussion above has suggested the effect of marital conflict on child problem behaviours is mediated by compromised parenting, other research has suggested alternative pathways. In a middle class sample of 80 mothers and their 6 month old infants, Crockenberg, Leerkes & Lekka (2007) found antenatal marital conflict, infant temperament and negative maternal behaviour predicted infant withdrawal at 6 months. Negative maternal behaviour however did not mediate the effect of marital conflict on infant behaviour. Thus the effect of marital conflict on infant withdrawal was not explained by its effect on maternal behaviour. There may be a direct relation between marital conflict and infant problem behaviours and/or there may be other mediating variables involved.

Other important relationships that have demonstrated effects on the development of child problem behaviours include the parent-child relationship and a

mother's relationship with her own parents. These will be discussed from an attachment perspective in Chapter four.

3.7.3 Summary

Maternal and infant characteristics have been shown to affect a mother's relationships with her child and her spouse. These have been shown in turn to affect the development of both parenting stress and child problem behaviours. Thus parenting stress may mediate or moderate relationship effects on the development of toddler internalising and externalising problem behaviours.

So far discussion has considered parenting stress as a global construct acting as a generic risk factor for both internalising and externalising problem behaviours in young children. In an attempt to elucidate potentially differential developmental pathways to internalising versus externalising problem behaviours, the next section will consider potential differential effects of components of parenting stress.

3.8 Are there different pathways to internalising versus externalising problem behaviours from different sources of parenting stress?

Parenting stress is presumed to interfere with the development of an infant's regulation skills and has been implicated in the development and maintenance of internalising and externalising problem behaviours (Cicchetti & Toth, 1991). Proposed mechanisms for the effect of parenting stress on child problem behaviours include direct exposure to stress, heritability, parent-child dysregulation, exposure to negative emotionality and modeling (McCarty & McMahon, 2003). Twin and adoption studies have demonstrated a strong genetic component to dyadic mutuality of three year olds and their mothers (Deater-Deckard & O'Connor, 2000). Interpersonal theory predicts compromised parenting mediates the relationship between parenting stress and the development of child problem behaviours (Crnic & Low, 2002; Grant et al., 2006; Hammen & Rudolph, 1996; Webster-Stratton, 1990). High maternal stress has been associated with less supportive, more controlling

parenting in mothers in high and low risk samples across the preschool period (Belsky, Woodworth & Crnic, 1996; Campbell, Shaw & Gilliom, 2000; Crnic, Gaze & Hoffman, 2005; Crnic &Low; Deater-Deckard, 2004; Kochanska, Aksan, Penney & Boldt, 2007; McKelvey, Fitzgerald, Schiffman & Von Eye, 2002; Popp, Spinrad & Smith, 2008; Smith, 2010).

Some researchers have emphasised the cumulative effects of stressors, where the total amount of stress regardless of its sources determines outcomes (Abidin; Belsky, 2002; Morgan, Robinson & Aldridge, 2002). Child vulnerability, attachment, parenting and familial adversity risk factors have been shown to operate in additive and multiplicative ways such that it is the cumulative risk experienced by a child rather than specific patterns of individual risk factors that seems to matter with respect to levels of problem behaviours (Belsky & Fearon, 2002; Greenberg, Speltz, DeKlyen & Jones, 2001). In support of the cumulative risk argument, Gregory, Eley and Plomin (2004) concluded the same environmental factors contributed to the development of early anxiety and conduct problems in preschoolers.

The use of cumulative risk indicators however masks developmental mechanisms associated with the development of internalising versus externalising problem behaviours. There are few studies that delineate specific pathways to either internalising or externalising problem behaviours (Thompson & Raikes, 2003). Bogels and Brechman-Toussaint (2006) proposed a specific pathway to internalising problem behaviours from the interaction of anxious temperament with family factors such as maternal anxiety and family stress. However there is a paucity of such studies with infants. Very little is known about how early patterns of risk appear, what the risk factors are in infancy and how problem behaviours vary over the first two years and with developmental stage.

Crnic, Gaze and Hoffman (2005) investigated the effects of cumulative stress over the preschool period on mother-child interaction and child behaviour at age 5 in a low risk community sample. After controlling for child temperamental negativity, stress explained a small amount of variance in maternal positivity with child (5%) and

dyadic pleasure (7%) but none of the variance in maternal negativity with child or dyadic conflict. However cumulative stress accounted for 15% of the variance in CBCL child problem behaviours at age 5. The authors proposed parenting may mediate specific aspects of parenting stress that affect the child's emotional security. The results of this study suggest mechanisms other than through the affective tone in the parent-child relationship link parenting stress to child problem behaviours. The authors concluded parenting stress was a multidimensional construct with differential relations with parenting, parent-child relationships and the development of child problem behaviours. Note also this study considered total problems only and did not investigate potential pathways from parenting stress to internalising versus externalising problem behaviours.

Despite known dimensionality of parenting stress, research has predominantly considered the effects of total parenting stress on the development of child internalising and externalising problem behaviours. Differential relations may reflect different mechanisms from different sources of parenting stress (Grant et al., 2003; McMahon, Grant, Compas, Thurm & Ey, 2003). Some aspects of parenting stress may be indirectly related to child regulation via their effects on parenting or on maternal well being. For example, Smith (2010) found contextual stress measured as high workload and financial stress, but not parent-child relationship stress, was associated with negative parenting of three year olds.

Other aspects of parenting stress may have direct effects on child regulation (Yates, Obradovic & Egeland, 2010). Costa, Weems, Pelerin and Dalton (2006) considered concurrent associations of specific aspects of parenting stress, using the PSI short form (Abidin, 1990) and controlling for maternal psychopathology, with CBCL internalising and externalising problem behaviours in a high risk referred sample of children aged 5-17 years. Stress arising from dysfunctional parent-child interactions, including negative parent perceptions and feelings of alienation or disappointment, was related to internalising problem behaviours. Stress arising from having a child with a difficult child temperament was related to both internalising and externalising problem behaviours. Consistent with overreporting of problem

behaviours by mothers with mental health difficulties (De Los Reyes & Kazdin, 2004), maternal psychopathology accounted for the relation between parental distress and child problem behaviours.

Thus the study described above demonstrated different relations with internalising versus externalising problem behaviours from different aspects of parenting stress. For example stress arising from within the parent-child relationship may be more associated with internalising problem behaviours. Or stress arising from a mother's relationships with others apart from her child may be more associated with externalising problem behaviours. An investigation of the potential differential effects of toddler internalising versus externalising problem behaviours from different sources of stress may help to elucidate developmental mechanisms.

3.9 Looking at the development of toddler problem behaviours through a parenting stress lens

Researchers have called for a unifying organisational perspective that focuses on explanatory mechanisms of influence in the development of child problem behaviours (Östberg & Hagekull, 2000). As reviewed above, research to date has produced an extensive list of direct associations between maternal and infant individual and relationship characteristics, and the development of child internalising and externalising problem behaviours. Other research has demonstrated similar effects on the development of parenting stress. Thus it is proposed in the current study the development of toddler internalising and externalising problem behaviours may be organised through a parenting stress lens.

From this perspective, maternal, infant and relationship characteristics affect parenting stress which in turn affects the development of toddler problem behaviours. From their review of child and adolescent studies Grant et al. (2006) concluded there was support for the mediation of the relation between stressors and child problem behaviours by the parent-child relationship and parenting behaviours. However this assumption has rarely been tested directly, particularly in

infancy. Two recent studies involving preschoolers did not support the parenting mediation hypothesis (Anthony et al., 2005; Crnic, Gaze & Hoffman, 2005). Whilst it would not seem prudent to reject such a widely held and intuitively appealing assumption on the basis of just two studies, it is likely that parenting stress affects the development of child problem behaviours via pathways other than just through compromised parenting.

For example, there is likely to be considerable heritability of stress regulation and hence direct pathways from parenting stress to child problem behaviours can be expected (Deater-Deckard, 2004). Thus the degree to which parenting stress directly affects the parent-child relationship and the development of child problem behaviours remains in question. There are likely to be direct, mediated and moderated pathways from maternal, infant and relationship characteristics through the parenting stress lens to toddler problem behaviours. The next section discusses the transactional nature of the development of toddler problem behaviours from interactions amongst parenting stress and developmental constructs residing in the child, the mother and their relationship.

3.9.1 Interactions amongst maternal and infant characteristics, the parent-child relationship and parenting stress affect toddler internalising and externalising problem behaviours

Individual characteristics, psychological and social processes interact to influence the relations between stressors and child problem behaviours (Grant et al., 2003). For example interactions between child temperament and caregiving experiences in infancy have been shown to affect both infant and caregiver behaviour (Repetti, Taylor & Seeman, 2002; Sheese, Voelker, Rothbart, & Posner, 2007). Patterson (1982) observed highly hyperactive and irritable children were likely to elicit poor parenting and potentiate coercive cycles of attempts by both parent and child to control one another through hostility and power assertion resulting in the child engaging in disruptive externalising behaviours.

Further, Gartstein and Bateman (2008) reported maternal depression and fearfulness as well as initial infant fearfulness contributed to the growth of infant fearfulness and internalising problem behaviours at age 2 years. And Hane and Fox (2006) have demonstrated caregiving effects on the development of infant stress reactivity in a low risk sample after controlling for temperamental reaction to novelty at 4 months. The authors found low quality, insensitive or intrusive mothering was associated with greater concurrent infant fearfulness at 9 months. Infant attention, perseveration, fussiness and frustration have been shown to be moderated by maternal affect dysregulation as early as 5 and 9 months of age (Crockenberg, Leekes & Barrig Jo, 2008; Leve et al., 2010; Natsuaki et al., 2010). These studies support Hane and Fox's conclusion that variation in the mother-child relationship in low risk populations has important consequences for infants' developing self-regulation. Eisenberg and Valiente (2004) emphasised the need to consider both individual and relationship characteristics in the development of regulation and internalising and externalising problem behaviours.

There are reciprocal and dynamic relations between stressors and mediators and moderators of child problem behaviours. Crnic and Booth (1991) noted it is not just the child that develops over time, so too do other aspects of the family system such as the parent-child relationship, the marital relationship and parenting stress. Sameroff and McKenzie (2003) have emphasised the importance of incorporating the effects of the development of all constructs in order to more closely approximate what is happening in the real world over time. The reciprocal transactions between parent and child developmental constructs have begun to be captured in models of developmental cascades of events that are affecting each other over time (Eisenberg et al., 2010; Masten et al., 2005).

As discussed in the first chapter, developmental cascade models control for across time stability of constructs and within time covariation amongst constructs. For example, Gross and colleagues (Gross, Shaw, Moilanen, Dishion, & Wilson, 2008; Gross, Shaw, Burwell & Nagin, 2009), have demonstrated ongoing reciprocal effects of child internalising and externalising disruptive behaviours and maternal

depression from toddlerhood. Further, in a longitudinal study of adopted children Lipscomb et al. (2011) demonstrated environmental linkages between trajectories of overreactive parenting, parenting self-efficacy and infant and toddler negative emotionality. However whilst it is widely acknowledged maternal and child constructs such as parenting stress and infant adjustment are developing in interaction with each other over time, few studies have investigated such transactional models. McMahon, Grant, Compas, Thurm and Ey (2003), observed that most stress research has been cross sectional and thus there is little knowledge of the effects of changes in relations between stress and adjustment over time.

A recent study investigated transactional relations amongst contextual stress, parenting quality and child internalising and externalising problem behaviours using a nested developmental cascade structural equation model in a high risk sample of 200 teenage mother-child dyads when children were aged 2 to 6 years (Yates, Obradovic & Egeland, 2010). The model demonstrated stability of parenting stress, parenting and child adjustment from 2 to 6 years. However, after taking across time stability into account, no further relations between parenting stress, parent and problem behaviours were supported in the model. Eisenberg and Valiente (2004) have observed the difficulty in demonstrating significant bidirectional effects in developmental cascade models due to across time construct stability.

3.9.2 Summary

Parenting stress has been proposed to be a central construct in the development of toddler problem behaviours. Components of parenting stress may have differential effects on the development of internalising versus externalising problem behaviours. Effects of maternal and child risk factors may be mediated or moderated by parenting stress. Constructs are likely to be intertwined and codevelop over time. Attempts to delineate pathways to toddlers' internalising versus externalising problem behaviours should take these multiplicative, developmental cascading relationships into account. Differential susceptibility was introduced in the first chapter as the interaction between infant vulnerable temperament and rearing environment risk. The next section will discuss the

interaction between infant temperamental vulnerability and stress, a specific aspect of rearing environment risk.

3.10 Are infants differentially susceptible to a stressful rearing environment?

The previous section described how developmental outcomes are determined by the interaction of infant characteristics with other aspects of the rearing environment (Collins, Macoby, Steinberg, Hetherington & Bornstein, 2000; Thomas, Chess & Birch, 1977). The differential susceptibility hypothesis introduced in the previous chapter posits environmental influences do not affect all children equally (Belsky, 1997; Belsky, Bakermans-Kranenburg & Van Ijzendoorn, 2007; Belsky & Pluess, 2009). Children with difficult temperaments have been shown to be more affected by positive and negative factors in their rearing environment (Eisenberg, Cumberland & Spinrad, 1998). That is, these children have the most to gain or the most to lose. Differential susceptibility effects are demonstrated as interactions between caregiving variables and child characteristics such as difficult temperament.

Children have been shown to be differentially susceptible to stress (Gunnar & Cheatham, 2003; Oland & Shaw, 2005). In a series of studies Calkins and colleagues demonstrated differential susceptibility to the effects of maternal stress on mother-infant interactions in highly frustrated 6 month old infants (Calkins & Dedmon, 2000; Calkins, Dedmon, Gill, Lomax & Johnson, 2002; Calkins & House, 2004). Whereas some children reacted with anger and frustration to even mild stressors (Calkins et al., 2002), others responded with fear and withdrawal (Fox, Henderson, Marshall, Nichols & Ghera, 2005).

There are individual differences in environmental sensitivity, stress reactivity and regulatory capacity (Skinner & Zimmer-Gembeck, 2007). Stress reactivity and coping have been shown to be determined by the interaction of temperamental vulnerability with aspects of the child's rearing environment (Belsky, 1999). Highly sensitive children with higher negative emotionality, fearfulness and inhibition, have

lower thresholds to stress and therefore are more susceptible to the detrimental effects of parenting stress (Boyce & Ellis, 2005; Kochanska, 1998). Repetti, Taylor and Seeman (2002) concluded the interaction of genetic vulnerability from temperamental reactivity or high inhibition and familial stress resulted in stress regulation deficits that were evident in infancy.

Deficits manifested as internalising and externalising problem behaviours and were presumed to reflect information processing biases and warped emotion processing that prevented receiving support and exacerbated a negative, stressful environment. However Deater-Deckard (2004) noted that many children of stressed parents do not exhibit problem behaviours and similarly, many parents of children displaying problem behaviours do not have elevated parenting stress levels. Hence person-centred research identifying which groups of parents and children are affected would be useful. This is taken up in the next section with respect to trajectories of mothers' parenting stress over infancy.

3.11 Trajectories of mothers' parenting stress over infancy

Deater-Deckard (2004) described parenting stress as a process that changes and develops over time within the parent-child relationship. According to Lazarus and Folkman's (1984) reciprocal theory of stress and coping, mothers are constantly adapting to changes in stresses in their environment. Despite this, parenting stress has been shown to be moderately stable and slightly decreasing across the preschool period (Crnic, Gaze & Hoffman, 2005; Deater-Deckard, 2005; Yates, Obradovic & Egeland, 2010). Little is known of the course of parenting stress across infancy.

Chronic stress can be presumed to have more disruptive effects on child development than short term, moderately stressful events. Crnic, Gaze and Hoffman (2005) have studied the cumulative effects of stress on child problem behaviours over the preschool period from ages 3 to 5 years in a low risk community sample. The authors reported high stability of daily hassles in mothers of children aged 3-5 years. Mothers were grouped as having either high or low daily stress at 6 monthly

intervals. A cumulative stress measure was formed from continuity and change in group membership across the study period. Thirteen percent of mothers had stable high stress; 65% had stable low levels of stress; and 22% had fluctuating stress levels across 3-5years. Similar proportions were found for life stress.

Stability in maternal reported parenting stress may be reflective of enduring aspects of maternal personality affecting stress appraisal and coping and thus can be expected to be relatively stable across their child's development. Alternatively, stability of parenting stress may be specific to the preschool period, with other different stress profiles in other developmental stages such as infancy. Increased stress could be expected in the second year in the transition from infancy to toddlerhood, due to increased child demands requiring more discipline and patience (Fagot & Kavanagh, 1993).

Research findings of the course of parenting stress have been equivocal. Crnic and Booth (1991) reported a cross-sectional increase in parenting stress as daily hassles in parents of children aged from 1 year to 3 years in a low risk sample. In a longitudinal study of low-income, young mothers of infants aged 14, 24 and 36 months, Chang and Fine (2007) reported slightly decreasing parenting stress from 14 to 24 months using the PSI short form(Abidin, 1990). Growth mixture modeling resulted in three parenting stress trajectories comprising chronically high stress (7%), increasing stress (10%) and decreasing stress (83%). Thus a person-centred approach demonstrated a normative decrease across infancy for most high risk mothers with around one fifth of mothers having stable high or increasing parenting stress. Elevated depressive symptoms, low self efficacy and a temperamentally difficult child predicted membership in the chronically high trajectory. Depression and less self-efficacy distinguished the increasing from the decreasing trajectories. Family conflict did not differ amongst the trajectories.

Mulsow, Caldera, Pursley, Reifman and Huston (2002) grouped low income mothers according to their low, medium or high parenting stress levels across the first three years. Mothers' stress levels were found to be either chronically high, low,

increasing or decreasing from when their infants 1 month to 36 months old. Proportions of mothers in each group were not reported. Use of different stress measures at different time points however precluded the extraction of growth trajectories. Less is known of the changes in parenting stress starting in early infancy under 12 months, particularly in the general population. A person-centred investigation of parenting stress across infancy in a low risk population would add to the body of knowledge of the effects of stress on normative child development.

3.12 Gaps and hypotheses arising from the literature

The lack of a theoretical model of the development of parenting stress was highlighted as a gap in the literature. This will be addressed by an empirical investigation in Chapter six of the determinants of parenting stress conceptualised as a modified "Determinants of parenting" model (Belsky, 1984). Mothers' parenting stress was hypothesised to be determined by her self-regulatory capacity and her relational stress. Self-regulatory capacity was represented by maternal depression and attachment. The amount of stress in the mother's environment was represented by her infant's difficult temperament, and relational difficulties both with her spouse and with her infant.

It was hypothesised early maternal attachment represented contributions from a mother's past that she brought into her current relations. Early maternal attachment and infant difficult temperament were predicted to affect concurrent negative marital relations and maternal depression which in turn were expected to predict infant attachment and parenting stress. Direct and indirect relations from early maternal attachment and infant difficult temperament were hypothesised. Maternal attachment anxiety and infant difficult temperament at 4 months were expected to be directly associated with increased parenting stress at 12 months. In contrast, it was expected maternal attachment avoidance at 4 months would either be directly associated with reduced parenting stress at 12 months or be unrelated to parenting stress.

Indirect effects of maternal attachment and infant difficult temperament were also expected via their effects on negative marital relations, maternal depression and infant attachment anxiety and avoidance. Maternal depression and negative marital relations at 4 months were expected to be associated with increased parenting stress at 12 months. Positive marital relations were proposed to buffer the negative effects of compromised self-regulatory capacity and a stressful environment.

There has been a lack of consideration in the literature of the differential effects of components of parenting stress. This study considered parenting stress as consisting of two dimensions. Whereas parent-child stress arose from sources of stress within the parent-child relationship, parent-other stress resulted from a mother's relationships with others outside the parent-child relationship. Empirical investigations in chapter six will explore differential pathways to parent-child versus parent-others stress. Empirical investigations in chapter seven will investigate differential effects of these components of parenting stress on toddler behavioural outcomes. It was hypothesised parent-child stress may be more influential than parent-other stress in the development of toddler internalising problem behaviours. In contrast, it was hypothesised parent-other stress may be more influential than parent-child stress in the development of toddler externalising problem behaviours

The lack of simultaneous investigations of determinants of toddler problem behaviours from parenting and attachment constructs was highlighted. This study addressed this gap by including an investigation in chapter seven of the prediction of toddler problem behaviours from maternal and infant attachment and parenting stress. A review of the research indicated mediation and/or moderation of the development of toddler problem behaviours from maternal, infant and relational characteristics has been assumed but not tested directly in infant populations. In the current chapter it was proposed parenting stress may be an organising construct for the development of toddler problem behaviours. Exploration of direct, mediating and moderating effects of parenting stress on the development of toddler problem behaviours will be investigated in chapter seven.

The paucity of research linking parenting stress in infancy to subsequent toddler problem behaviours was highlighted in this chapter. This gap will be addressed by an investigation of the effect of chronic parenting stress across infancy on the development of toddler problem behaviours in chapter eight. Trajectories of mothers' parenting stress across infancy were expected to predict both internalising and externalising problem behaviours in two year old toddlers. Specifically, two trajectories of mothers' parenting stress across their infants' first two years were expected in this community sample. A high risk trajectory was expected to comprise approximately 10% of the sample's mothers with consistently high levels of parenting stress from when their infants were aged from 4 to 24 months of age. The remaining approximately 90% of mothers were expected to report low levels of parenting stress across infancy. It was expected mothers in the high parenting stress trajectory would have toddlers with higher levels of both internalising and externalising problem behaviours at two years of age compared with those mothers in the low stress trajectory.

3.13 Summary and conclusions

This chapter has reviewed literature demonstrating associations between factors affecting parenting stress, the quality of the mother-infant relationship and the development of infant problem behaviours. Belsky's (1984) determinants of parenting model was reconceptualised as a parenting stress and child development model. The pervasive, reciprocal and dynamic influences of maternal and child characteristics on all relationships have been acknowledged. The effects of other maternal relationships on parenting stress and the mother-infant relationship have been demonstrated, with primary influence being attributed to a mother's relationship with herself, via personality and psychopathology, and the marital relationship. A mother's developmental relationship with her own parents will be discussed in the next chapter when we consider the effects of maternal attachment on the development of infant attachment.

Belsky's (1984) parenting and child development model represented a theoretical synthesis of disparate pieces of research, mostly non-experimental and correlational, which individually supported parts, but not all of, their parenting model. Fifteen years later, Belsky (1999) again suggested that parenting and infant development risk factors be considered simultaneously in order to investigate the net effects of multiple mediation, moderation and interactions between predictors on infant development. The literature reviewed in this chapter has demonstrated that this gap has been filled considerably, although there is still relatively little parenting research in general, and parenting stress research in particular, in low risk infant populations. Further, which aspects of parenting stress are associated with internalising or externalising problem behaviours in young children remains in question. The importance of person-centred research in delineating "at risk" mother-infant dyads has been highlighted. In contrast, there is a vast body of infant attachment knowledge. The next chapter will consider the relations between maternal attachment with respect to her childhood relationship with her parents, infant attachment, as a specific aspect of the mother-infant relationship and parenting stress.

Chapter 4

A change of focus: Looking through bifocal lenses of attachment anxiety and avoidance

Chapter 4: A change of focus: Looking through bifocal lenses of attachment anxiety and avoidance

The previous chapter discussed effects of maternal and infant characteristics on parenting stress and the development of toddler internalising and externalising problem behaviours. Parenting research has also highlighted the importance of the parent-child relationship in determining child outcomes (Hinde & Stevenson-Hinde, 1988; Brook, Whiteman, Finch & Cohen, 1998; Miller, Cowan, Cowan, Hetherington & Clingempeel, 1993). Attachment research has described the mother-infant attachment relationship as the prototype for all future relationships and central to the development of regulation difficulties such as internalising and externalising problem behaviours. Compromised parenting has been shown to affect the mother-infant attachment bond and attachment strategies adopted by the infant to alleviate stress. Thus the effects of compromised parenting and parenting stress on the development of child problem behaviours may be mediated or moderated by attachment anxiety and avoidance in the mother-infant attachment relationship. This chapter will examine the dimensions of attachment anxiety and avoidance and current knowledge regarding their determinants and associations with parenting stress and child temperament. The following chapter will discuss relations between attachment anxiety and avoidance and the development of problem behaviours in toddlers.

4.1 Attachment as a theory of self-regulation

Attachment has been defined as a biologically based, enduring strong emotional bond with a particular person that functions to provide protection, safety and security from either physical or psychological contact (Bowlby, 1969; 1973; 1980; 1988; Gunnar & Quevedo, 2007; Sroufe & Waters, 1977; Lewis, 1997). Attachment theorists have proposed affective development and expression are organised around a person's attachment relationships. Sroufe (2005) asserted attachment was the most important development construct in infancy due to its

pervasive role in initiating multiple developmental pathways and critical developmental functions such as social relatedness, arousal modulation, emotional regulation and curiosity.

The attachment relationship between a mother and her infant is presumed to function as a relational regulation system and may be either a source of support or stress depending upon the quality of the relationship (Dallaire & Weinraub, 2007; Deater-Deckard, 2004; Guttmann-Steinmetz & Crowell, 2006; Polan & Hofer, 2008). Toddler problem behaviours have been described in the first chapter as regulation challenges. Greenberg, Speltz and DeKlyen (1993) distinguished the function of attachment from other parenting practices such as behaviour control and disciplining. Thus attachment theory has the potential to increase understanding of the development of internalising and externalising problem behaviours.

Schore (2000; 2001) described the social tuning of infant stress regulatory circuits through the attachment relationship and has highlighted the dysregulatory effects of disturbed attachment relationships. The next section will explore the conceptualisation of attachment strategies as stress management strategies.

4.2 The relationship between attachment strategies of anxiety and avoidance and stress management

According to attachment theory, attachment strategies are used to alleviate stress and distress (Bowlby, 1973; Gunnar & Donzella, 2002; Mikulincer, Shaver & Pereg, 2003; Schore, 2000). Infants' attachment strategies are purported to be determined by their appraisal of the availability and efficacy of their caregiver, which in turn is determined by situational, parenting and temperament factors. Bowlby proposed a person's attachment history affected their stress regulation capacities. There has been considerable support for this proposition in both infants and adults. Increased stress tolerance has been observed in infants in secure attachment relationships with their competent mothers (Gunnar & Cheatham, 2003; Polan &

Hofer, 2008). Securely attached adults have been shown to use more effective support seeking coping strategies (Mikulincer, Shaver & Pereg).

Attachment strategies in infancy are initially chiefly behavioural, involving proximity and contact seeking and contact maintenance with their primary attachment figure. As discussed in chapter two, in the first 12 months postpartum, infants do not yet have a separate sense of self and thus they are highly dependent on caregiver presence for co-regulation. With cognitive development of the internal working model, or secure base script, attachment strategies are presumed to gradually operate more at a subconscious, organisational level. The internal working model of attachment has been described as an internally represented set of expectations about future interactions based on past interactions and is presumed to affect a person's social cognitive style in interpersonal relations (Sroufe & Fleeson, 1986; Bowlby, 1988). Adults may also have access to reflective function and conscious memory to guide their choice of attachment strategies for managing stress (Crittenden, 2008; Fonagy & Target, 1997).

Attachment strategies have been shown to be effective in managing stress (Dallaire & Weinraub, 2007; Gunnar, 2005; Mikulincer, Shaver & Pereg, 2003; Mills-Koonce et al., 2007). Sroufe (1979) surmised lasting consequences of inadequate care, manifested as infant attachment insecurity, may involve increased vulnerability to stress. Infants in a secure attachment relationship with their mother experience less stress and distress and more positive emotions in their daily interactions (Mikulincer & Shaver, 2008). Mothers and infants with ineffective attachment strategies, who are restricted in attentional and emotional control, have been shown to be less reliant on proximity seeking strategies and more reliant on reflexive, less adaptive, physiological coping responses to stress (Gunnar & Quevedo, 2007). The next section will describe contrasting attachment strategies of anxiety versus avoidance purported to develop in response to predictable differences in caregiving.

4.3 Dimensions of attachment anxiety and avoidance

Historically much attachment research has been conducted using either attachment classifications or the unidimensional attachment security construct derived from the Adult Attachment Interview (AAI; George, Kaplan, & Main, 1984) and the Strange Situation infant attachment measures (SS; Ainsworth, Blehar, Waters & Wall, 1978). Individuals have been classified as being either organised or disorganised with respect to their attachment strategies. Attachment strategies can result in either secure or insecure attachment. Attachment disorganisation has been associated with clinical populations and psychopathology. Recent research however has demonstrated the importance of insecure attachment strategies and not attachment disorganisation per se in the development of problem behaviours in toddlers in low risk populations (Pauli-Pott, Haverkock, Pott & Beckmann, 2007).

Adult attachment research has also used self report to measure continuous dimensions of attachment anxiety and avoidance. Different attachment styles, reflecting varying combinations of self-reported attachment anxiety and avoidance, are presumed to reflect different stress relieving strategies (Hazan & Shaver, 1987). Attachment style has been defined as a person's stable patterns of thoughts and behaviours in current intimate relationships that are purportedly based on their past attachment experiences in their close relationships and act as a framework for organising emotional experience (Hazan & Shaver, 1994). Self-reported attachment anxiety and avoidance have been associated with several aspects of adult psychological functioning affecting relationship quality including defense strategies and coping, support seeking and giving, emotional memory, attitudes, marital relationship quality and parenting behaviour (Edelstein, Alexander, Shaver, Schaaf, Quas, Lovas et al., 2004; Feeney, 1996; Rholes, Simpson & Blakely, 1995; Simpson & Rholes, 1998).

Using factor analysis and taxonometric methods, Fraley and colleagues have demonstrated both adult attachment, assessed using the Adult Attachment Interview, and infant attachment, assessed using the Strange Situation, are best

represented by two dimensions conceptualised as attachment-avoidance and attachment-anxiety (Fraley & Spieker, 2003; Haydon, Roisman, Marks & Fraley, 2011; Haydon, Roisman & Burt, 2012; Roisman, Fraley & Belsky, 2007). Organisation under stress is proposed to involve restrictions in attention, either toward the attachment figure to the exclusion of all else, in the case of elevated attachment anxiety, or away from the attachment figure and towards aspects of the environment, in the case of elevated attachment avoidance (Main, 2000).

Continuous dimensions of adult attachment have greater explanatory power than categorical classifications (Bakermans-Kranenburg & Van Ijzendoorn, 2009; Cowan, Cowan & Mehta, 2009). This is especially important in low risk populations where levels of insecure attachment are lower. Attachment insecurity can be represented by high attachment avoidance and/or anxiety. Securely attached mothers and infants have a range of levels of anxiety and avoidance which also affect interpersonal behaviours and coping strategies. Hesse (2008) has called for new attachment research using attachment dimensions rather than classifications. The attachment anxiety dimension will be discussed next.

4.3.1 Attachment anxiety

Elevated attachment anxiety has been associated with hyperactivity of the attachment system involving restricted attention to distress cues and aversive stimuli, negative self beliefs and negative emotions in interactions within attachment relationships (Creasey & Ladd, 2005; Kobak & Seery, 1988; Main, 2000). Recently, Haydon, Roisman and Burt (2012) demonstrated an anxious state of mind was associated with heightened positive and negative affect in a couples' conflict interaction task. Adults with elevated attachment anxiety have been shown to be less effective at regulating negative emotions such as anger (Mikulincer & Shaver, 2008). Anxious stress management strategies involve preoccupation of attention to close relationships with others to maintain security. Support seeking using anxious attachment behaviours is generally ineffective and involves maximising closeness to others through clinging and controlling behaviours characterised by helplessness and

distress (Cassidy, 1994; Feeney & Noller, 1996; Weinfeld, Sroufe, Egeland & Carlson, 2008).

Attachment anxiety and proximity to an ineffective, inconsistent caregiver is presumed to be driven by a fear of being alone and vulnerable (Mikulincer, Shaver & Pereg, 2003). Cassidy (1994) has described attachment anxiety as resulting from the conflict between the desire for intimacy and the fear of rejection or disgust when others are disappointing, rejecting or unavailable. Anxious mothers are presumed to be more attuned to their own needs than their child's and have been shown to provide erratic, chaotic, inconsistent caregiving with preferential attention to negative emotions. The development of infant attachment anxiety is presumed to involve compulsive, overprotective caregiving that is intrusive and insensitive to the child's needs. This type of caregiving presumably disrupts the development of self-regulation, fosters dependency and inhibits autonomy (Rubin, Hastings, Shannon, Henderson, & Chen, 1997).

Self-regulation deficits associated with the development of attachment anxiety include a lack of control of memory, attention and behaviour (Mikulincer, Shaver & Pereg, 2003). Elevated attachment anxiety has been described as being undercontrolled with respect to attachment (Sroufe, 1983; Cole, Michel &Teti, 1994). Most of the literature has presumed a link between attachment anxiety and internalising problem behaviours. In the first chapter however, undercontrol was associated with children with externalising problem behaviours. Thus there may also be a link between attachment anxiety and externalising problem behaviours. Indeed, elevated attachment anxiety has been associated with both internalising disorders such as depression and anxiety and externalising disorders such as conduct disorder (Mikulincer & Shaver, 2008). Further associations with the development of problem behaviours from attachment anxiety will be discussed in the next chapter. The dimension of attachment avoidance will be described next.

4.3.2 Attachment avoidance

Elevated attachment avoidance has been associated with deactivation of the attachment system characterised by self-reliance and emotional and physical distance (Cassidy & Kobak, 1988; Mikulincer & Shaver, 2008). Avoidant coping purportedly involves restricting attention away from the person and focusing on the environment and maintaining a positive self view by avoiding negative memories and self representations that may imply stress or vulnerability (Creasey & Ladd, 2005; Crittenden, 2008; Fraley, Garner & Shaver, 2000; Main, 2000). Avoidant coping strategies involve withdrawal from the problem through denial, emotional discharge and repression (Fraley & Shaver, 1997). Recently, Haydon, Roisman and Burt (2012) demonstrated an avoidant state of mind was associated with the suppression of positive and negative affect in a couples' conflict interaction task. Attachment avoidance has been associated with dissociated anger and the construction of barriers or defenses to protect against conscious access to negative experiences and emotions, which are neither acknowledged nor reported.

Avoidant strategies are presumed to have arisen from an attachment history characterised by rejection or unavailability of others in their close relationships. Mothers with elevated attachment avoidance have been shown to push the child to be more independent by being unavailable, rejecting and unresponsive when the child is distressed. Attachment avoidance is presumed to be driven by a fear of punishment or rejection from the attachment figure. Temperamental reactivity characterised by intense responses to caregiver unavailability, reactivity and intolerance to frustration, is also presumed to underlie the development of attachment avoidance (Mikulincer, Shaver & Pereg, 2003).

Avoidant coping has been associated with family conflict and harsh, punitive parenting that minimises attachment-related feelings and attention to negative affect (Power, 2004). Main and Weston (1981) proposed avoidantly attached infants had learned to mask their distress as a strategy to ensure caregiver proximity and had learned their own self-regulatory behaviour in the absence of their caregiver's soothing. When attachment avoidance is elevated, attention is restricted to divert

attention from distress cues and aversive stimuli and emotion is restricted to avoid negative emotions (Main, 2000). This is thought to circumvent the expression of anger.

Attachment theorists have presumed a link between attachment avoidance and externalising problem behaviours. This has been demonstrated empirically and is consistent with avoidant coping through emotional discharge. For example, in a high risk sample of teenage mothers, Munson, McMahon and Spieker (2001) demonstrated one year old infants who were classified as insecurely avoidantly attached or disorganised with respect to attachment to their mother had persistently higher levels of externalising problem behaviours from preschool to 9 years of age than securely attached infants. However, elevated attachment avoidance has also been associated with internalising disorders such as depression resulting from estrangement and loneliness in adults (Mikulincer & Shaver, 2008). These are consistent with emotional coping through suppression and repression representing overcontrol with respect to attachment (Sroufe, 1983; Cole, Michel & Teti, 1994) and the association of overcontrol with internalising problem behaviours described in the first chapter. According to Bartholomew and Horowitz (1991), attachment avoidance involves having a negative view of others. Views of self may be either negative or positive. Observed differences in outcomes from attachment avoidance may be due to differences in self view. Thus attachment avoidance may involve multiple dimensions with different sequelae, either externalising or internalising. Associations between attachment avoidance and internalising versus externalising problem behaviours are discussed in more depth in the following chapter.

Whilst most adopt a fallback predominant attachment strategy of either anxiety or avoidance, the dimensional view of attachment transcends the “either/or” dichotomy and allows flexibility of responding. The following section discusses the capacity for individuals to use either strategy of anxiety or avoidance according to the demands of the particular situation.

4.3.3 Co-occurrence of attachment strategies involving anxiety and avoidance

Different attachment strategies may be used according to the particular situation or relationship (Crittenden, 2008). For example, secure adults have been shown to be somewhat avoidantly attached towards one parent whilst being somewhat preoccupied toward the other. Infants may also adopt a different approach depending upon the nature and extent of the distress they are experiencing and with whom. Proximity may be used in some circumstances and avoidance in others. Some infants in the Strange Situation have shown moderate avoidance of their mother on reunion under conditions of low stress compared with no avoidance when highly stressed. Others have shown a mixture of avoidant and anxious strategies in their attempts to gain relief from their distress arising from their separation from their mother. By gauging their mother's availability and mood infants may select the strategy that seems to best fit the context. It is possible there may be a relation between the co-occurrence of attachment avoidance and anxiety strategies for managing distress and the co-occurrence of internalising and externalising problem behaviours.

4.3.4 The relationship between attachment security and dimensions of attachment anxiety and avoidance

Attachment security has been associated with greater confidence in the availability of others and comfort with closeness that has developed from a history of positive attachment relations. Secure adults have positive expectations about their own and others' ability to manage stress and use support seeking as a coping strategy (Collins & Read, 1994; Mikulincer & Florian, 1995). Secure attachment has also been characterised by self-control, behavioural reciprocity, and more skilled social interactions (Cole, Michel & Teti, 1994; Weinfeld, Sroufe, Egeland & Carlson, 1999). On average, securely attachment adults are more psychologically balanced and have reflective, less restricted access to a wide range of social information including emotions, memory and behavioural plans (Fonagy & Target, 1997; Crittenden, 2008). Mothers who are judged as having a secure state of mind with respect to attachment on the AAI have low attachment anxiety and avoidance and can discuss attachment experiences with clarity, openness and coherence (Main,

2000). Thus attachment security reflects low levels of both attachment anxiety and avoidance.

4.3.4 Summary

Attachment strategies have been described as stress management strategies involving either anxious, heightened proximity seeking behaviours or avoidant, withdrawing, suppressing behaviours. Individuals are likely to have a predominant pattern of responding under stress however some may adopt either strategy depensing upon the context. Secure versus insecure attachment reflects the degree of attachment anxiety or avoidance adopted. Research has supported continuous dimensions of attachment anxiety and avoidance over discrete classifications or patterns. Securely attached individuals have low levels of attachment anxiety or avoidance compared with elevated levels in those who are judged to be insecurely attached. Measurement of infant and adult attachment anxiety and avoidance will be described in the following two sections.

4.4 Measurement of infant attachment anxiety and avoidance

The security of an infant's attachment to its mother is presumed to represent a specific aspect of the mother-infant relationship involving the regulation of proximity of the child to its mother in order to protect the child from danger (Bowlby, 1982). Ainsworth, Blehar, Waters and Wall (1978) concluded healthy emotional development was promoted by the sense of trust that an infant had in the availability of their primary caregiver as a secure base to which to retreat in times of stress. They characterised secure, avoidant and ambivalent/resistant patterns of attachment behaviour observed in infants both in the home and in their laboratory paradigm, the "Strange Situation". Classification was based on reunion behaviours of the infant towards the mothers rated as proximity seeking, contact maintenance, avoidance and resistance.

Later a disorganised pattern (Main & Solomon, 1990) was added to the attachment classifications. Infants are classified separately according to their overall attachment organisation/disorganisation and predominant attachment strategy utilised within the Strange Situation. Thus an infant may be organised with respect to attachment and adopt predominantly attachment avoidance as their attachment strategy. Similarly, an infant may be judged to be disorganised overall with respect to attachment but their predominant strategy may be attachment avoidance. Table 4.1 describes Strange Situation (SS) infant attachment classifications and their prevalence in low risk populations based on meta-analyses and literature reviews (De Wolff & Van Ijzendoorn, 1997; van Ijzendoorn & Koonenberg, 1988; van Ijzendoorn and Sagi-Schwartz, 2008). Infant behaviour in the Strange Situation can be conceptualised as reflecting the quality of the parent-child relationship and represents an observational measure of infant co-regulation strategies (Roisman, Madsen, Hennighausen, Sroufe & Collins, 2001; Sroufe & Fleeson, 1988).

Ainsworth, Blehar, Waters and Wall (1978), also described the attachment classifications using two continuous, discriminant functions. One function discriminated avoidant strategies from proximity seeking strategies, and the second distinguished resistance or ambivalence toward the mother from no resistance. Fraley and Spieker (2003) conducted a principal components analysis with oblique rotation on 1,139 Strange Situations of fifteen month old infants. In accordance with Ainsworth et al., they preferred a two factor solution consisting of a proximity seeking versus avoidance factor and an anger and resistance factor. The Contact Maintenance and Proximity Seeking and negative Avoidance behaviours scales in both reunions loaded onto the avoidance factor. Resistance scores in both reunions loaded onto the resistance or attachment anxiety factor.

Table 4.1

Strange Situation infant attachment classifications, descriptions and prevalence in low risk populations

Classification	Infant Strange Situation Behaviour	Prevalence in Low Risk Populations
Avoidant (A) ***High Avoidance Low Anxiety***	Defensive behaviour not secure, independent, Actively inhibits response to seek comfort despite similar physiological arousal, Does not seek physical contact with caregiver, defensive strategy of diverting attention from anything that would activate attachment behaviour, play without affective sharing with carer, does not show distress on separation, treats the carer and stranger treated equally, and ignores or avoids mother on return.	20%
Secure (B) ***Low-moderate Avoidance and Anxiety***	Seeks physical contact with caregiver for reassurance especially in reunion episodes, uses caregiver as secure base for exploration, exhibits extreme dependence, prefers mother for comfort	55-65%
Resistant (C) ***Low Avoidance High Anxiety***	Resistance to the caregiver, angry, pushing, hitting. Wary even when mother is present, distressed on separation, wants proximity on reunion but not to be calmed, maybe passively distressed and cry but don't actively seek comfort, or may seek contact and then resist it angrily, ambivalence towards mother	10-15%
Disorganised (D)	No coherent strategy, conflicting patterns	<10%

4.5 Measurement of maternal attachment anxiety and avoidance

The Adult Attachment Interview (AAI) purportedly assesses an adult's current state of mind with respect to their childhood attachment relationship to their own parents (George, Kaplan & Main, 1984; 1996; Main, Goldwyn & Hesse, 2002). Judgments are made on several Attachment State of mind (SOM) scales based on features of the speaker's discourse when answering the attachment related questions. Recent research has demonstrated the AAI SOM scales load onto two factors of attachment avoidance and anxiety (Bernier, Larose, Boivin & Soucy, 2004; Larose, Bernier & Soucy, 2005; Haydon, Roisman & Fraley, 2011; Haydon, Roisman & Burt, 2012; Roisman, Fraley & Belsky, 2007). The avoidance factor was comprised of the Dismissing scales including Lack of memory, and Derogation and Idealisation of mother or father. The anxiety factor was comprised of the Preoccupied scales of Passivity and Involving anger of mother or father.

Adult attachment and anxiety has been shown to differentiate emotion profiles in adults (Consedine & Magai, 2003). Avoidant adults express less joy, shame and fear than anxious adults. Similarly, Roisman, Tsai and Chiang (2004) reported secure adults displayed emotions that were consistent with their narrative, avoidant adults indicated suppression of emotion and anxious adults displayed emotions that were incongruent with their narrative. These results are consistent with the affect minimising versus maximising strategies of attachment avoidance and anxiety respectively. Similar AAI concordance between genetically and non-genetically related siblings provides support for a strong environmental component to the development of adult attachment anxiety and avoidance (Caspers, Yucuis, Troutman, Arndt, & Langbehn, 2007).

Table 4.2 describes Adult attachment interview (AAI) classifications and their prevalence in low risk populations reported in meta-analyses (Bakermans-Kranenburg & van Izjendoorn, 1993; 2009). The Adult attachment interview can be conceptualised as reflecting an adult's current state of mind with respect to their

childhood experiences and current relationship with their parents (George, Kaplan & Main, 1996).

Table 4.2

Adult Attachment Interview attachment classifications, descriptions and prevalence in low risk populations

Classification	Adult attachment interview discourse	Prevalence in Low Risk Populations
Dismissing ***High Avoidance Low Anxiety***	Defensive discourse characterised by one or more affect minimising strategies including lack of memory, derogation of mother or father or presenting a positive, idealised picture of their childhood relationship with at least one of their parents. Structural inconsistencies in the narrative due to a lack of supporting evidence. Attributes no effects from childhood attachment experiences. Values strength and independence and materialism	20-25%
Secure ***Low-moderate Avoidance and Anxiety***	Open, collaborative discourse. Responses are complete. Speaker provides a balanced picture of their childhood relationship with their parents, including criticism of themselves and their parents without excessive blame to either party. Attributes effects of childhood attachment experiences to current personality and interpersonal function. Values attachment and relationships	55-65%
Preoccupied ***Low Avoidance High Anxiety***	Unbalanced negative presentation of childhood experiences with parents. Excessively blames parents. Attributes negative effects to parents. Values relationships. Discourse is disorganised, lengthy and often irrelevant. Speaker has trouble presenting clear, complete, balanced responses.	10-15%
Cannot Classify ***High Avoidance and Anxiety***	No coherent strategy, conflicting patterns may include both dismissing and preoccupied discourse patterns in different sections of the interview	<10%

In accordance with attachment theory's prototype hypothesis, classification research has demonstrated significant concordance between maternal and infant attachment. The next section will explore protypical and compensatory associations between dimensions of maternal and infant attachment anxiety and avoidance.

4.6 Associations between maternal and infant attachment anxiety and avoidance

Individual differences in self-protective, attachment strategies are presumed to be determined by the interactive effects of genetic inheritance, maturational processes and experiences in close relationships (Crittenden, 2008). Genetic research has demonstrated substantial environmental effects in the development of attachment (Caspers, Yucuis, Troutman, Arndt & Langbehn, 2007; Dozier, Albus & Bates, 2001; Stovall, O'Connor, Croft & Steele, 2000). What the mother brings to her interactions with her infant has been given a central role in attachment theory's predictions of child outcomes. Mother-infant relationship dynamics may be either protypical or complementary as discussed in the following two sections.

4.6.1 Maternal and infant attachment concordance: The prototype hypothesis

Attachment theory's prototype hypothesis purports one's childhood relationships with one's parents serves as a prototype for all future relationships (Bowlby, 1973; 1980; Fraley, 2002; Owens et al., 1995). Thus a mother's state of mind with respect to her childhood relationship with her parents is presumed to affect her relationship with her infant and with her spouse (Noftle & Shaver, 2006; Roisman et al., 2007). Shah, Fonagy and Strathearn (2010) surmised a mother's own childhood attachment experiences may have affected the development of her reward and affiliation circuits that may underlie attachment anxiety and avoidance and affect interactions with her baby.

In support of the prototype hypothesis, research has highlighted extensive inter-relations amongst adult attachment and parenting / family variables such as self-competence and self-esteem (Bowlby, 1982; Greenberg, Speltz & DeKlyen,

1993), and the ability to use social support, increased social competency and ability to create a stable childrearing environment (DeKlyen, 1996; Beach, Fincham, Katz & Bradbury, 1996; Coble, Gantt & Mallingkrodt, 1996). McMahon, Barnett, Kowalenko and Tenant (2006) demonstrated maternal attachment insecurity moderated the relation between maternal depression and infant attachment insecurity. Research has however has also produced mixed findings regarding the relationship between adult attachment security and marital satisfaction. Whereas Crowell, Treboux and Waters (2002) supported a relationship, other studies have not (Paley, Cox, Burchinal & Payne, 1999; Dozier & Tyrell, 1999; Waters, Crowell, Elliot, Corcoran & Treboux, 2002).

Moderate concordance between maternal and infant attachment in support of the prototype hypothesis has consistently been reported in the literature. Maternal state of mind with respect to attachment has been shown to explain around 22% of the variance in infant attachment security, higher than any other maternal or infant characteristics (Van Ijzendoorn, 1995). Higher concordance has been reported between securely attached mothers and infants, between 60-70%, than insecurely attached mothers and infants, between 10-35% (Dickstein, Seifer & Albus, 2009; McMahon, Barnett, Kowalenko & Tenant, 2006; Shah, Fonagy & Strathearn, 2010; Van Ijzendoorn, 1995). In a recent low risk Australian study, McMahon, Barnett, Kowalenko and Tenant reported 67% concordance for maternal and infant attachment security, 32% for maternal-infant attachment avoidance concordance and just 14% for maternal-infant attachment anxiety concordance. Comparisons in these studies were made on the basis of attachment classifications and hence no conclusions were drawn regarding the strength of the relations between maternal and infant dimensions of attachment anxiety and avoidance.

Similar concordance rates have been observed in adopted children versus biological children indicating a strong environmental explanation to the development of infant attachment (Dozier, Stovall, Albus & Bates, 2001). Cohn and Tronick (1988) demonstrated that infants match their mothers' affect. Thus concordance in attachment anxiety or avoidance between mother and infant can be

expected through affect matching and direct modeling (Cassidy, 1994). It is predicted that affect matching and thus attachment concordance, will occur where maternal attachment anxiety or avoidance levels are either high or low.

Research has demonstrated anxious mothers tend to have anxious babies (Meadows, McLanahan & Brooks-Gunn, 2007). Mothers with elevated attachment anxiety have been shown to be overprotective, intrusive, and have difficulty separating from their infants (Cassidy & Berlin, 1994). Thus, attachment anxiety concordance may be mediated by overprotective parenting. Attachment concordance can also be expected from mothers with elevated attachment avoidance who model and endorse avoidant behaviour with their infant (Pederson & Moran, 1995). Mothers with elevated attachment avoidance are more likely to attend to positive emotions and ignore negative emotions in their child. Thus the child will be more likely to suppress and not express negative emotions and hence exhibit more attachment avoidance.

Infants adapt to their mother's caregiving to optimise their protection and survival. This may involve the adoption of a similar or complementary strategy of interaction to that taken by the mother. Discussion above has provided support for maternal and infant attachment concordance. The next section will discuss complementarity of mother-infant interaction.

4.6.2 Maternal and infant attachment inversion: Infant compensatory model

Recently a small, low risk study also reported inversion rates for insecure attachment classifications of around 50% (Shah, Fonagy & Strathearn, 2010). In other words, around half of the mothers with an avoidant state of mind had an anxious attachment relationship with their infant at 14 months and similarly about half of the mothers with a preoccupied state of mind had an avoidant attachment relationship with their infant. Adopting a complementary strategy, resulting in maternal-infant attachment inversion, is expected to occur when mothers have moderate levels of attachment anxiety or avoidance. Inversion is proposed to be more likely in low risk

samples which have smaller variations in caregiving and less abuse and neglect than in high risk samples.

4.6.2.1Maternal attachment avoidance and infant attachment anxiety

There are several potential mechanisms that could explain mother avoidant attachment-infant anxious attachment inversion. For example, a moderately avoidant mother, whilst still mostly attentive and responsive, may heighten a child's attachment expressions in order to get her mother's attention such that the child may appear to be more anxious than avoidant. Hence an infant may use attachment anxiety as a strategy for interaction with a moderately affectively distant mother.

Alternatively, a mother with a compromised attachment history with either her parents or her partner or both, may attempt to compensate for this in her relations with her own child resulting in heightened infant attachment anxiety. Or perhaps there is a mismatch in temperament and relationship history between mother and child due to contributions from the father. Compulsive caregiving has been described by Crittenden (2006) as a form of attachment avoidance that allows avoidance of negative feelings about oneself by focusing on the needs of others. It is feasible that a mother with elevated attachment avoidance who engages in compulsive caregiving may foster dependency in her infant and elevated attachment anxiety. Attachment inversion may be more likely with avoidant mothers who hold a negative view of themselves as this may be linked to inconsistency and incompetence in caregiving which have been associated with infant attachment anxiety.

4.6.2.2 Maternal attachment anxiety and infant attachment avoidance

Overinvolved mothers with elevated attachment anxiety have been found to have avoidantly attached infants (Cassidy, 1994; Pederson & Moran, 1995). A moderately anxious mother may evoke avoidance in their child as a coping strategy to her persistent intrusiveness and insensitivity. Or there may be a mismatch in temperament and relationship history between mother and child due to contributions from the child's father. The mother may escalate her attempts to

engage her child resulting in either amplification or amelioration of the child's temperamental withdrawal.

4.6.3 Summary

There is support for both concordance and complementarity of attachment strategy between mothers and their infants. Anxious mothers may foster anxiety or avoidance in their infants. Similarly, avoidant mothers may develop an avoidant or anxious relationship with their infant. Conditions under which attachment concordance or complementarity occur are yet to be investigated. It has been proposed attachment concordance may result when mothers have higher levels of anxiety or avoidance. Attachment complementarity may occur in more moderate levels of maternal anxiety or avoidance or from contributions from other factors such as paternal genetics. The next section explores other factors that may contribute to the development of infant attachment anxiety or avoidance.

4.7 Maternal characteristics and relationship influences on infant attachment anxiety and avoidance

Just as infants have been shown to have differential susceptibility to mothering (Belsky, 1997), it is also likely vulnerable mothers are more susceptible to the effects of environmental risk on their capacity to provide quality mothering. Multiple risk factors have been associated with the mother-infant attachment relationship (Carter, Garrity-Rokous, Chazan-Cohen, Little & Briggs-Gowan, 2001). Belsky (1984) proposed proximal risk factors such as depression and parenting stress would affect infant attachment more than distal factors such as marital relations. More recent meta-analyses support Belsky's model with greater effects of maternal depression and parenting stress than negative marital relations on infant attachment security in non-clinical populations (r=.18, r=.19 versus r=.14 respectively; Atkinson et al., 2000; Martins & Gaffan, 2000; Van Ijzendoorn, Schuengel & Bakermans-Kranenburg, 1999).

Research has also demonstrated interrelations between maternal attachment, marital relations and maternal depression. For example, Feeney, Alexander, Noller and Hohaus (2003) demonstrated prenatal attachment anxiety predicted postnatal depression in the transition to parenthood only when the spouse was a compulsive caregiver. Results were interpreted as the maladaptive effects of maternal attachment anxiety and compromised marital relations becoming more apparent under conditions of stress, such as following the birth of a mother's first child. Das Eiden, Teti and Corns (1995) reported moderation of the effects of marital relations on infant attachment by maternal attachment. Marital relations were associated with infant attachment only for insecure mothers who had elevated levels of either attachment anxiety or avoidance. Other studies support these findings (Paley, Cox, Burchinal & Payne, 1999; Roisman, Padron, Sroufe & Egeland, 2002).

Recently, Dickstein, Seifer and Albus (2009) demonstrated coherence of attachment working models across maternal attachment history, marital and parenting domains. Roisman, Madsen, Hennghausen, Sroufe, and Collins (2001) concluded coherence of dyadic interactions across salient relationships reflected a common underlying representation of relationships in accordance with the prototype hypothesis. This could be expected to carry forward into the mother's relationship with her child but was not tested in either study.

These studies have investigated relations with negative marital relations only. Positive relations have the potential to buffer the effects of other risk factors on the development of infant attachment. Only a few researchers have incorporated both negative and positive marital relations in their investigations. Frosch, Mangelsdorf and McHale (2000) reported a longitudinal association between negative marital relations at six months and 3-year old attachment insecurity in their sample of fifty-seven US university town families. Positive marital relations were associated with father-child but not mother-child attachment. It has been suggested equivocal findings of buffering effects from support and positive marital relations on infant attachment may be due to greater resources and lower stress in low risk populations (Huth-Bocks, Levendosky, Bogat & von Eye, 2004).

Huth-Bocks, Levendosky, Bogat and von Eye (2004) modeled infant attachment at 1 year from maternal attachment, maternal caregiving representation (Zeanah, Benoit, Hirshberg, Barton & Regan, 1994), social support and maternal demographic and domestic violence risk variables measured in the last trimester of pregnancy, using structural equation modeling (SEM) in a heterogeneous sample of 206 mother-infant dyads. Prenatal maternal caregiving representation mediated the effects of maternal attachment and prenatal maternal risk factors on infant attachment. Prenatal risk was measured by low income, single motherhood and experiences of domestic violence. Social support, particularly from other women, also mediated the relation between maternal attachment and infant attachment security. The authors reported a non-significant relationship between maternal attachment and mother-infant attachment and attributed a greater role to demographic risk factors, social support and maternal representations of caregiving. Strengths of this study include a large sample size, the integration of attachment and social context factors, the use of longitudinal SEM, and the measurement of social support at both time points.

However, Huth-Bocks, Levendosky, Bogat and von Eye (2004) measured maternal attachment using a self-report version of the AAI, the Perceptions of Adult Attachment Questionnaire (Lichtenstein & Cassidy, 1991), and not the traditional AAI thus limiting generalisability to other studies. Although Lichenstein and Cassidy reported significant correlations amongst the self-report AAI and the original AAI, factor analysis revealed a unidimensional maternal attachment security factor in contrast to the two factor solution of the AAI (Roisman, Fraley & Belsky, 2007). Further, the global social support construct did not distinguish between the relative contributions of spousal versus other sources of support. Infant-mother attachment was also modeled as single dimension, felt security, in accordance with Bretherton, Biringen, Ridgeway, Maslin and Sherman (1989), but contrary to several studies that have demonstrated attachment is a two dimensional construct (Richters, Waters & Vaughn, 1988; Bartholomew & Shaver, 1998; Fraley & Spieker, 2003). Thus, conclusions could not be made with respect to the etiology of different types of attachment strategy, avoidance versus anxiety.

The Dickstein, Seifer and Albus (2009) study used structural equation modeling to demonstrate mediation of the longitudinal relation from maternal attachment to infant attachment by multiple measures of marital and family functioning in a low risk sample. They demonstrated coherence of working models of relationships across marital and parental domains that could be traced back to the mother's own attachment experiences as a child. Conclusions were restricted to positive global effects of attachment security however on marital and family function due to the modeling of maternal attachment as a dichotomous unidimensional construct. Further, the effects of environmental continuity, bidirectionality and child influences were not considered in the study.

4.7.1 Summary

Research demonstrating coherence of working models across relationships supports attachment's prototype hypothesis. Maternal attachment is proposed to affect a mother's relationships with others including her spouse and her child. Marital relations and support were shown to mediate the relations between maternal and infant attachment security. Unidimensional analyses however precluded the investigation of hypotheses regarding potential differential pathways to infant attachment anxiety versus avoidance from marital and social support factors. The next section will explore contributions from background variables and child temperament to the development of infant attachment anxiety and avoidance.

4.8 Background and child influences on the development of infant attachment anxiety and avoidance

Child temperament and maternal personality characteristics at 8 months were found to predict infant attachment at 12 months in a low risk sample (Mangelsdorf, Gunnar, Kestenbaum, Lang & Andreas, 1990). Infant attachment avoidance was associated with lower positive affect, higher fearlessness and lower maternal positive affect than infant attachment anxiety. Both child temperament and marital

relations were found to moderate the effect of parental beliefs on infant attachment (Wong, Mangelsdorf, Brown, Neff, & Schoppe-Sullivan, 2009).

Harrison and Ungerer (2002) used a hierarchical logistical regression analysis to predict infant attachment security in an at risk Australian sample of 125 mother-infant dyads. They found infant attachment security, scored dichotomously, was more likely when mothers were more sensitive in interaction with their infants, returned to work before their child was seven months old, had a positive prenatal attitude regarding returning to work, were older, reported more support in their personal relationships and higher infant irritability. Maternal depression, psychological vulnerability and marital quality did not predict any additional variance. Many of the mothers of anxiously-attached infants chose not to return to work. The authors proposed that this may be a reflection of a mother's immature coping style and encouragement and prolonging of their baby's dependency, consistent with Cassidy and Berlin (1994).

The Harrison and Ungerer (2002) study provides Australian data on the maternal, child and relational antecedents of infant attachment security and thus is relevant to this study. The logistic regression reduced infant attachment variance to a binary matrix, which limited conclusions with respect to the etiology of different patterns of infant attachment. This is compensated somewhat by the authors' thoughtful discussion of maternal antecedents and the potential moderation of anxious infant attachment by maternal employment factors.

Overall however, findings have been equivocal with respect to the impact of birth order, gender, social class, maternal age, infant temperament, maternal personality, marital variables and social support on infant attachment in low risk samples. Since development is multiply determined, mediating and moderating relations are likely to be involved (Bronfenbrenner, 1979; Colin, 1996). Researchers have emphasised the importance of investigating several factors simultaneously and noted that much of the earlier attachment research neglected to do so (Belsky & Pasco Fearon, 2008; Thompson & Raikes, 2003). It is likely that other sources of

individual difference in infant security result from transactions amongst multiple sources of influence.

4.8.1 Summary

Findings from the extensive infant attachment antecedent literature have revealed maternal attachment, insensitivity and depression, low SES and teenage motherhood were the only variables that have consistently been demonstrated to predict insecure infant attachment (Cicchetti, Rogosch & Toth, 1998; Colin, 1996). Findings with respect to the role of infant temperament have been equivocal. Conclusions have been limited by the use of attachment classifications and simplistic research designs that have concentrated on investigating direct effects of single constructs rather than investigating effects of multiple interacting constructs. Potential mediating and moderating relationships affecting the development of infant attachment anxiety and avoidance from maternal attachment will be explored in the next section.

4.9 Exploring mechanisms for the association between maternal attachment and infant attachment

Sibling, genetic and adoption attachment research has demonstrated substantial environmental effects in the prediction of attachment security (Bakermans-Kranenburg & van IJzendoorn, 2008; Bokhorst et al., 2003; Vaughn, Bost & van Ijzendoorn, 2008). Quality of care is presumed to mediate the relationship between maternal factors and infant attachment. Care that is characterised by accurate reading of infant cues, affective attunement and synchrony of appropriate responding across a wide range of positive and negative emotions, has been associated with infants low in attachment anxiety and avoidance (Cassidy, 1994; Sroufe, 1979; Stern, 1985). Dysfunctional parent-child interactions have been shown to be associated with attachment insecurity, either high in avoidance or anxiety (Costa, Weems, Pelerin & Dalton, 2006). Mothers who themselves have elevated levels of attachment anxiety or avoidance can be expected to have limitations on the

quality of their interactions with their infant which may be associated with elevated levels of infant attachment anxiety or avoidance.

Earlier discussion demonstrated substantial discordance between maternal and infant attachment. There has been a significant effort to uncover other key explanatory developmental constructs to explain the "transmission gap" between maternal and infant attachment. Much of this research has focused on the maternal sensitivity construct discussed below.

4.9.1 Maternal sensitivity

Sensitive mothering has been described as the primary mechanism underlying the development of infant attachment security. Sensitivity involves close bodily contact, high maternal emotional involvement and communicative competence. Researchers have demonstrated increased sensitivity with securely attached infants compared with infants with elevated attachment avoidance or anxiety (Ainsworth Blehar, Waters & Wall, 1978; Belsky, Rovine & Taylor, 1984; Cassidy & Berlin, 1994; Isabella & Belsky, 1991). Research has demonstrated mothers of the latter are less responsive, more interfering, and less accessible and engaged in fewer mutual and reciprocal exchanges with their infant. Mothers of avoidantly attached infants averted physical contact and expressed little emotion with their infant. Anxious infant attachment was associated with mothers who were inconsistent in their availability and responsivity to their infant.

Bowlby (1988) postulated a mother's capacity for sensitive mothering was influenced by her current relationships and by her own past experience of mothering. Mothers low on attachment anxiety and avoidance have been shown to release more oxytocin in response to their 7 month old infants' cues than mothers with elevated attachment avoidance, demonstrating greater emotional satisfaction from interactions with their child (Strathearn, Fonagy, Amico & Montague, 2009). However, De Wolff and van Ijzendoorn's meta-analysis (1997) concluded maternal sensitivity explained just one half of the relationship between maternal attachment and infant attachment and , one fifth of the infant attachment variance overall. Thus

maternal sensitivity has been shown to be an important, but not exclusive condition of infant attachment security.

Further, Pederson and Moran (1996) noted maternal sensitivity did not distinguish between infants who had been classified as either insecurely-avoidant versus insecurely-resistantly attached to their mothers. Finally, although maternal attachment is an important predictor of infant attachment, a significant portion of the variance remains to be explained by other factors. Thus different constructs are needed to explain the observed individual differences in infant attachment. For example, parenting stress may have direct and indirect effects on the development of infant attachment and problem behaviours. The role of parenting stress in the development of infant attachment anxiety and avoidance is discussed next.

4.9.2 Parenting stress as a central organisational construct for the antecedents and sequelae of infant attachment

Parenting stress can be viewed as a proxy measure for adversity or cumulative risk in the child rearing environment. Several studies have demonstrated decreased emotion regulation and increased stress in mothers with elevated attachment anxiety or avoidance compared with secure mothers with low attachment anxiety and avoidance (Diamond & Aspinwall, 2003; Mikulincer & Shaver, 2008; Roisman, Tsai & Chiang, 2004). It has also been suggested insecure mothers are less able to cope with stress, such as the stress associated with the transition to parenthood and are less able to co-regulate stress in their infants (Carlson, Sampson & Sroufe, 2003). Mothers with elevated attachment anxiety can be expected to report elevated parenting stress and tend to have a negative view of themselves and the world (Mikulincer & Shaver). Conversely, avoidant mothers repress negative responses to stress and try to keep them beneath consciousness using denial, suppression, inhibition or masking (Mikulincer & Shaver). Thus they can therefore be expected to minimise self-reports of distress and have lower self-reported parenting stress (Kobak & Seery, 1988).

Parenting stress has been shown to interfere with a mother's capacity to be sensitive and responsive with her infant (Hart, 1985). Thus parenting stress may account for some of the variance in infant attachment explained by maternal attachment anxiety and avoidance and maternal sensitivity. Secondary attachment strategies of avoidance and anxiety can be expected to break down under conditions of high stress. Phelps, Belsky and Crnic (1998) demonstrated that stress moderated the effect of maternal attachment on parenting. There was no difference in parenting under conditions of low stress amongst mothers with varying levels of attachment anxiety or avoidance. However parenting by secure mothers with low attachment anxiety and avoidance was less affected by high stress compared with insecure mothers with either elevated attachment anxiety or avoidance. Unfortunately the authors did not differentiate between the insecure mothers and thus no conclusions could be drawn with respect to differential effects of stress on the parenting of anxious versus avoidant mothers.

A few studies have linked increased parenting stress to insecure infant attachment (Belsky, 1999; Deater-Deckard, 2004; Hadadian & Merbler, 1996; Jarvis & Creasey, 1991; Robson, 1997; Shaw & Vondra, 1993; Teti, Nakagawa, Das & Wirth, 1991). Atkinson et al.'s (2000) meta analysis concluded a small effect of parenting stress on infant attachment. One study however did not find an association between parenting stress and infant attachment in a low risk population of infants (Teti, Gelfand, Messinger & Isabella, 1991).

Zelenko et al. (2005) reported increased stress in the Strange Situation for both mother and infant for infants high in attachment anxiety. Animal research has shown that under conditions of high stress, approach strategies are aborted and precocious avoidant learning is stimulated instead (Polan & Hofer, 2008). Perhaps increased attachment avoidance also results in human infants who have been reared in a highly stressed environment. Avoidant infants are expected to have a lower stress threshold and be ill equipped to deal with stress. They are therefore more likely to exhibit problem behaviours in response to stress and distress.

A concurrent study in a low income sample demonstrated interrelations among parenting stress from parent-child dysfunction (measured using the PSI short form, Abidin, 1990), attachment security (assessed using the Attachment Q Sort), and maternal depression (Coyle, Roggman & Newland, 2002). Mothers had relatively low levels of stress and depression in the sample. The authors constructed a contemporaneous path model that linked marital stress to maternal depression which in turn was associated with increased parenting stress and lower attachment security. The model explained 17% of the variance in infant attachment security. Maternal depression and economic stress only accounted for 8% of the variance in stress arising from parent-child dysfunction. The authors surmised different types of stress may have different pathways of influence on the development of infant attachment. Thus although pervasive moderate effects of maternal depression on maternal relationships have been well documented, parenting stress has the capacity to explain additional variance in infant development and provide a net risk effect framework.

No interaction effects were investigated in the study described above. It is likely parenting stress may moderate infant attachment such that different strategies are manifest at different levels of stress. For example, some securely attached infants may show mild avoidance under conditions of low stress in the Strange Situation's first reunion episode. However this gives way to proximity seeking under conditions of high stress in the second reunion episode. For other infants, early low avoidance is escalated to insecure levels as stress increases.

Average stress levels are likely to be low to moderate in a low risk sample. Parenting stress effects on infant attachment and development may only be significant at elevated stress levels and/or in conjunction with other risk factors such as child vulnerability to risk due to a difficult temperament. An investigation of the moderation of risk factors by parenting stress in addition to longitudinal person-centred analyses would help clarify the relationship between parenting stress and the development of infant attachment in low risk populations. This chapter's last

section will discuss the role of infants' differential susceptibility to risk in the development of infant attachment anxiety and avoidance.

4.9.3 Differential susceptibility to infant attachment anxiety and avoidance

After reviewing the extensive temperament and attachment research, Vaughn, Bost and van Ijzendoorn (2008) concluded the influence of temperamental irritability on infant attachment was relatively minor compared with caregiving effects. This conclusion was based however on infant attachment security and not on dimensions of infant attachment anxiety and avoidance. Infant temperament can be expected to play a considerable role in an infant's tendency to either withdraw or engage in interpersonal conflict in stressful situations.

Thus temperament may be involved in determining the types of insecure attachment strategies, anxiety or avoidance, adopted by infants (Belsky & Pasco Fearon, 2008; Sroufe, 1985). Cassidy (1994; Cassidy & Berlin, 1994) noted temperament constrained the range of infant behaviour such that temperamentally vulnerable infants seemed more likely to develop attachment anxiety. Further, Marshall and Fox (2005) reported associations between increased motor activity and distress at 4 months and attachment avoidance at 12 months, and between fearfulness and negativity and anxious attachment. Early infant difficult temperament and stress regulation has been shown to affect the development of infant attachment in addition to maternal sensitivity (Fuertes, Santos, Beeghly & Tronick, 2006). Pathways between maternal attachment and infant attachment may also be moderated by child temperament. For example, an interaction between maternal anxiety and child fearful inhibited temperament could be expected to predict infant attachment anxiety.

Van Bakel and Riksen-Walraven (2002) investigated the effects of concurrent parent, child and contextual factors on infant attachment security and child development in a heterogeneous, demographically diverse community sample of 129 Dutch mothers and their 15 month old infants. Based on Belsky's (1984) determinants of parenting and child development model and using a

contemporaneous path model, infant attachment was modeled from observed quality of maternal interactions and child social fearfulness. Pathways from maternal attachment security, assessed dichotomously using the self-report Relationship Questionnaire (Bartholomew & Horowitz, 1991), to infant attachment security, assessed using the Attachment Q-sort (Waters & Deane, 1985), were mediated by quality of maternal interactive behaviour. Pathways from maternal attachment to maternal interactive behaviour were mediated by pathways of partner support, maternal ego resiliency and maternal education.

Child fearfulness was also related to quality of maternal interactive behaviour (van Bakel & Riksen-Walraven, 2002). The authors surmised fearful infants elicited more sensitive caring from their mothers consistent with Belsky, Rha and Park (2000), and also noted different aspects of temperament may affect parenting at different developmental stages. There were no effects of gender or birth order. Whilst the study supported Belsky's (1984) proposed multiple determinants of parenting, investigations did not support Belsky's premise that parent characteristics were more important determinants of parenting quality than child characteristics or contextual factors such as partner support. Since infant attachment was measured using the Assessment Q sort which yields a unidimensional security score, findings did not provide information regarding pathways to anxious versus avoidant infant attachment. Further, conclusions of causality were limited by the concurrent research design and no interaction effects were investigated.

Belsky (1997) postulated the moderate effect of maternal sensitivity observed by van Ijzendoorn (1995) on infant attachment may have masked infants' differential susceptibility to the effects of mothering. Differential susceptibility to the effects of parenting stress on child problem behaviours due to temperamental vulnerability was discussed in the previous chapter. Researchers have proposed differential susceptibility to parenting also affects the development of infant attachment, with temperamentally vulnerable infants most at risk (Belsky & Pasco Fearon, 2008; Sroufe, 2005). For example, maternal rigidity predicted attachment insecurity only for highly distress prone infants (Mangelsdorf, Gunnar, Kestenbaum, Lang, &

Andreas, 1990). There are not a lot of developmental studies in infants and toddlers that have included both temperament and attachment constructs. Of those that have, several have demonstrated interactive effects between attachment and temperament on developmental outcomes (Fox & Hane, 2008; Pierrehumbert, Miljkovitch, Plancherel, Halfon, & Ansermet, 2000; Vaughn, Bost & Van Ijzendoorn, 2008).

Emotion processing biases have been demonstrated in infants and toddlers with elevated attachment anxiety or avoidance (Berlin, Cassidy & Appleyard, 2008; Kochanska, 2001). For example, behaviourally inhibited children who were anxiously attached were more likely to develop anxiety disorders (Warren, Huston, Egeland & Sroufe, 1997). Studies have supported the moderation of fear and inhibition by attachment security in toddlers (Kochanska, 2001; Nachmias, Gunnar, Mangelsdorf, Parritz & Buss et al., 1996; Spangler, Schieche, Ilg, Maier & Ackermann, 1994). Kochanska (2001) demonstrated emotion profiles across 9 to 33 months varied across Strange Situation classifications assessed at 14 months. Attachment security predicted 6% of the variance in children's fear and 12.5% of the variance in negative emotions (fear and anger) at 33 months, over and above the effects of earlier levels of fear. Infants with elevated attachment anxiety showed the most fear and distress and least joy. Infants with elevated attachment avoidance showed the most negative emotion. Secure infants became less angry. Further, Kochanska (1995; 1997; 1998) found moderating and mediating effects of attachment security and temperament in the development of conscience, empathy and compliance. Findings in these studies are consistent with Greenberg and colleagues' (1990; 1993) child development risk factor model that incorporated interactions between attachment, temperament and family ecology.

4.9.4 Summary

There has been some support in the attachment literature for the prototype hypothesis predicting flow on effects from a mother's state of mind with respect to her childhood relationship with her parents to her relationships with her spouse and her child. Maternal sensitivity has been the most important mediating variable

between maternal and infant attachment. Discussion above proposed parenting stress may also be an important explanatory variable. Research has not supported influence from temperamental vulnerability on the development of infant attachment. Discussion above however has suggested temperament may be important in the moderation of maternal influences and in the adoption of anxious versus avoidant attachment strategies. The need for research designs that capture the developmental complexity of multiple interacting constructs has been emphasised throughout.

4.10 Gaps and hypotheses arising from the literature

A significant gap in the attachment literature was highlighted in this chapter, namely the lack of consideration of differential pathways to and from different insecure attachment strategies of anxiety and avoidance. This was explained as being due to the reliance in attachment research methodology on small samples and the use of classifications rather than continuous dimensions which resulted in reduced statistical power. This study will address this gap by using two continuous dimensions of attachment anxiety versus avoidance in a moderately sized sample.

Maternal attachment anxiety was hypothesised to contribute to the development of parenting stress possibly mediated by negative marital relations and maternal depression. Both concordant and inverted pathways to infant attachment anxiety versus avoidance from maternal attachment anxiety and avoidance were hypothesised to be possible. Empirical investigations in chapter six will explore these possibilities for the first time using continuous attachment dimensions. This represents a leap forward in attachment research methodology and will add significantly to the body of knowledge.

4.11 Summary and Conclusions

In summary, this chapter has described contributions from attachment research to the prediction of maternal and infant attachment anxiety and avoidance. Representation of attachment as a two dimensional construct of attachment anxiety and avoidance has been demonstrated empirically and has utility for discovering developmental mechanisms particularly in low risk populations. Maternal, child and relationship characteristics have been shown to affect the development of infant attachment. However, despite exhaustive research, maternal attachment remains the strongest predictor of infant attachment. The mediation of maternal and infant attachment by sensitive mothering has been shown to represent only part of the explanation of the development of individual differences in attachment. Parenting stress has been suggested as an alternative construct that may have utility for organising attachment relationships and developmental outcomes.

Literature reviewed has also demonstrated interactions between attachment and temperament affect developmental outcomes consistent with a transactional view of development. The next chapter will explore theoretical and empirical relations between attachment anxiety and avoidance and the development of internalising and externalising problem behaviours in toddlerhood. Recent attempts by researchers to elucidate the complex associations between parenting, attachment, and temperament and the development of internalising and externalising problem behaviours in young children will also be reviewed.

Chapter 5

Integrated research predicting infant problem behaviours from attachment and parenting variables

"The child is neither made invulnerable by secure attachment nor doomed to psychopathology from insecure attachment" Lewis (1997)

Chapter 5: Integrated research predicting infant problem behaviours from attachment and parenting variables

Chapter two described contributions to the understanding of the development of infant problem behaviours from the parenting body of literature. Maternal attachment was viewed as influencing marital relations and maternal depression, which in turn affected the mother-infant attachment relationship and parenting stress. Parenting stress was introduced as a key organising construct representing rearing environment risk. Interactions between infant difficult temperament and parenting were shown to be important in the development of toddler problem behaviours. Discussion acknowledged research to date had been unable to successfully capture the well-accepted notion that development is complex and multiply determined and highlighted the need for increased sophistication in research design and statistical analysis techniques, such as through the use of developmental cascade models, latent variable and person-centred growth analyses.

Whereas the parenting literature emphasised the marital relationship and maternal and child characteristics, this chapter will explore attachment research that has considered the roles of maternal and infant attachment in the prediction of toddler adjustment. Discussion will focus on the potential for dimensions of attachment anxiety and avoidance to predict specific pathways to toddler internalising versus externalising problem behaviours. Limitations of attachment research will be presented, including the predominant use of classifications over dimensions of attachment, small sample sizes and simplistic, unidirectional research designs.

Some recent integrated research has attempted to address the limitations of the largely disparate parenting and attachment bodies of research on infant development. Key examples will be discussed with an emphasis on integrated

findings, study limitations and suggested improvements in research design. The strength of longitudinal studies incorporating interacting contributions of dimensional attachment, child and parenting factors unfolding over infancy will be emphasised.

5.1 Associations between maternal attachment anxiety and avoidance and the development of toddler internalising and externalising problem behaviours

Maternal attachment has been associated with preschoolers' problem behaviours, both directly and indirectly. For example, Crowell, O'Connor, Wollmers, Sprafkin and Rao (1991) demonstrated maternal attachment insecurity was related to children's' problem behaviours. Vissenberg (2010) reported an association between maternal attachment and infant socioemotional adjustment at 6 months postpartum. Van Ijzendoorn, Krenenburg, Zwart-Woudstra, van Busschbach and Lambermon (1991) reported maternal AAI attachment security predicted socioemotional adjustment in one year old infants and preschoolers. Other studies have demonstrated indirect paths from maternal attachment to child problem behaviours mediated by constructs such as marital relations, parenting beliefs and discipline (Cowan, Cowan & Meehta, 2009; Grusec & Goodnow, 1994).

Some studies have drawn more specific conclusions with regards to the relationships between maternal attachment and child problem behaviours. For example, maternal attachment anxiety has been linked specifically with the development of child internalising disorders (Meadows, McLanahan & Brooks-Gunn, 2007). The previous chapter linked elevated maternal attachment anxiety to either overprotective or chaotic parenting. Earlier, overprotective parenting was linked to the development of infant internalising problem behaviours (Thomasgaard & Metz, 1999). Thus, it is possible maternal anxiety affects the development of internalising problem behaviours mediated by overprotective parenting. Chaotic parenting on the other hand may mediate the development of externalising problem behaviours by

maternal attachment anxiety. Thus maternal attachment anxiety may lead to either internalising or externalising problem behaviours mediated by parenting style.

High spoiling beliefs indicate a lack of understanding or belief in the importance of attachment relationships and thus can be expected to be associated with elevated maternal attachment avoidance. High spoiling beliefs have been shown to predict older toddler externalising problem behaviours in a community sample (Barnett, Shanahan, Deng, Haskett & Cox, 2010). Thus associations between maternal attachment avoidance and toddler externalising problem behaviours may be mediated by high spoiling beliefs. The interaction between high spoiling beliefs and insensitive parenting also predicted toddler internalising problem behaviours. Thus it is possible maternal attachment avoidance may also be associated with toddler internalising problem behaviours. In another study, increased externalising oppositional and aggressive behaviour was observed in school aged children of mothers with avoidant AAI attachment (Crowell, O'Connor, Wollmers, Sprafkin & Rao, 1991). Thus, as for maternal attachment anxiety, maternal attachment avoidance may also be associated with either internalising or externalising toddler problem behaviours. The next section will explore mechanisms that may underlie specific associations between maternal attachment anxiety or avoidance and toddler internalising versus externalising problem behaviours.

5.1.1 Potential developmental mechanisms underlying associations between maternal attachment anxiety and avoidance and toddler problem behaviours

Effects of maternal attachment anxiety and avoidance on the development of toddler internalising and externalising problem behaviours are presumed to reflect both genetic and socialisation influences. Anxious toddlers may have inherited anxious traits from their mothers and/or they may have learned anxious behaviours from those modeled by their anxious mothers. They may also experience more frustration in not having their needs met by their self-occupied mothers and express this frustration as aggression and non-compliance. Similarly, the lack of attention to negative feelings and attachment experiences of needing and depending modeled by

avoidant mothers may result in a lack of development of empathy and conscience in toddlers resulting in more externalising problem behaviours.

Differential pathways may depend upon how a mother expresses her attachment anxiety or avoidance. Perhaps a mother who exhibits attachment anxiety as involving anger in the AAI is more likely to express negative emotions with her child possibly leading to feelings of frustration and anger and externalising problem behaviours. In contrast, a mother whose AAI discourse is characterised by anxious passivity may model helplessness and confusion resulting in internalising problem behaviours.

Similarly, different strategies of maternal attachment avoidance described in the previous chapter, could be expected to have different effects on toddlers' emotional development and lead to either externalising or internalising problem behaviours. Maternal attachment avoidance expressed as derogation may indicate an outwardly cold, negative emotional climate in the home compared with the positive idealised stance that ignores negative experiences and emotions or the Lack of Memory strategy, which suppresses negative memories from consciousness. Outwardly cold, harsh parenting may foster infant avoidance of the mother and internalising regulatory strategies. A mother's lack of attention to negative emotions and experiences may both reflect a mother's lack of empathy with her infant and inhibit an infant's development of empathy. This may lead a toddler to exhibit externalising problem behaviours resulting from their frustration with their mother's inability to attend to her emotional needs fully.

There has been no research investigating the potentially differential effects of different maternal attachment strategies on the development of toddler internalising versus externalising problem behaviours described above. It seems likely that some of the influence of maternal attachment may be through effects on the mother-infant attachment relationship. However some maternal attachment influences on toddler problem behaviours may be more related to pragmatic and organisational aspects of parenting that may act outside the mother-infant

attachment relationship. Thus both direct and mediated paths from maternal attachment to toddler problem behaviours can be expected. Mediation may occur through the mother-infant relationship. The previous chapter highlighted the strong relation between maternal and infant attachment.

5.1.2 Summary

Research has demonstrated direct and mediated associations between maternal attachment and child problem behaviours. Maternal attachment is purported to affect parenting and/or the parent-child relationship, which in turn affect the development of child problem behaviours. The potential for differential paths to internalising versus externalising problem behaviours from different aspects of maternal attachment anxiety or avoidance was explored. As discussion in the latter part of this chapter will demonstrate, these differential paths remain largely untested. The next section will discuss associations between infant attachment and toddler problem behaviours.

5.2 Associations between infant attachment anxiety and avoidance and the development of toddler internalising and externalising problem behaviours

As discussed in the first three chapters, internalising and externalising problem behaviours are expected to occur when coping strategies such as attachment anxiety or avoidance, break down in the face of stressful demands that exceed a person's capacity to cope (Bowlby, 1988; Mikulincer & Shaver, 2008). Coping in infants has been described as initially occurring through co-regulation with their mothers in their attachment relationship and subsequently through increased self-regulation. Natural variations in infant stress response activation levels and regulation result from natural variations in maternal behaviours in the mother-infant attachment relationship (Fox & Hane, 2008; Polan & Hofer, 2008). Restricted stress reducing strategies and emotion expression in the mother is likely to result in less than optimal emotion regulation in the infant. Researchers have proposed difficulties in

affect regulation were responsible for later problem behaviours (Bretherton, Ridgeway & Cassidy, 1990; Cassidy, 1994; Thompson, 1998, 1999; Weinfeld, Sroufe, Egeland & Carlson, 2008).

Hence, attachment theory has provided a cogent paradigm for the investigation of infant emotion regulation deficits, personality development and adjustment. Much attachment research has fcused on associations between infant attachment insecurity and child problem behaviours. These will be discussed in the following section.

5.2.1 Associations between infant attachment insecurity and child problem behaviours

Insecure infant attachment has been shown to be a useful predictive risk factor for subsequent psychopathology. More than 80% of preschool children referred to mental health clinics had been classified as having insecure attachment relationships with their mothers (DeKlyen & Greenberg, 2008). However not all insecure infants go on to develop problem behaviours (Mikulincer, Shaver & Pereg, 2003; Sroufe, 2005). Sroufe observed most insecurely attached infants do not go on to develop serious behaviour problems or psychiatric diagnosis and that insecure attachment was a moderate risk factor for disturbance. Benoit (2004) surmised the high rate of attachment insecurity in the general population, around 30%, reduced its predictive power for psychopathology. Person-centred analyses and an investigation of other moderating factors in the general population would be useful in determining which insecure infants are most likely to be at greatest risk. Investigation of the risk and protective factors that explain different classes of toddlers according to levels of problem behaviours would help to further our understanding of the effects of different risk factors.

There is a substantial body of both clinical and nonclinical research, linking infant attachment to infant socioemotional adjustment (Ranson & Urichuk, 2008; Thompson, 2008). Extensive research using both concurrent and longitudinal studies and a variety of outcome measures and assessment methods, have provided

empirical evidence for the “securely attached infant as more competent child” hypothesis (Berlin, Cassidy & Appleyard, 2008; Kockanska, 2001). Meta- analyses (Schneider, Atkinson & Tardiff, 2001; Van Ijzendoorn, Verijken, Bakermans-Kranenburg & Riksen-Walraven, 2004), concluded a moderate effect size (r=.12 and r=.22 respectively), between infant attachment and infant adjustment. However some have concluded equivocal research findings (Lamb, 1987; Lewis, 1997; Scarr, 1992; Bates & Bayles, 1988; Waters, Weinfeld & Hamilton, 2000; Lewis, Feiring & Rosenthal, 2000). The strongest associations between infant attachment and infant adjustment were found in contemporaneous or short-term longitudinal studies that focused on competence in close relationships (Thompson, 2008). For example, Vondra, Shaw, Swearingen, Cohen and Owens (2001) found attachment security at 24 months but not at 12 months predicted infant adjustment at 3.5 years in a high risk, low income sample. Further, attachment security accounted for less than 10% of the variance.

Attachment insecurity may be a non-discriminant risk factor for both internalising and externalising problem behaviours (Costa & Weems, 2005; DeKlyen & Greenberg, 2008; Greenberg & Speltz, 1988; Shamir-Essakow, Ungerer & Rapee, 2005; Sroufe, 2005; Thompson, 2008; Toth & Cichetti, 1999; Van IJzendoorn, 1997). A recent meta-analysis reported a moderate effect size of infant attachment insecurity on preschool externalising problem behaviours (Pasco Fearon, Bakermans-Kranenburg, van Ijzendoorn, Lapsley & Roisman, 2010). Similar effects were reported for insecure-avoidance versus insecure-resistance. The authors surmised developmental changes in the third year amplified the link between attachment insecurity and externalising problem behaviours and emphasised the need for strong theory driven studies that addressed mediating processes.

There has been consistent empirical support for attachment insecurity as a generic risk factor for problem behaviours in high risk populations. For example, Vondra, Shaw, Swearingen, Cohen and Owens (2001) reported an association between infant attachment insecurity and externalising problem behaviours in preschoolers from low income families. Attachment insecurity at 15 months was also

related to three year old toddlers' internalising and externalising problem behaviours in alcoholic families (Edwards, das Eiden & Leonard, 2006).

Insecure infant attachment has been consistently been linked to emotion regulation difficulties and anxiety symptoms in children and adolescents (Albano, Chorpita & Barlow, 2003; Bohlin, Hagekull & Rydell, 2000; Bosquet & Egeland, 2006; Carlson & Sroufe, 1995; Dallaire & Weinraub, 2007). Brumariu and Kerns (2010) proposed a model of the development of anxiety from attachment insecurity, overcontrolling and overprotective parenting, high negative emotionality and behavioural inhibition. Their model for the development of depression from attachment insecurity was similar except that parenting was rejecting and child temperament was characterised by low positive emotionality as well as high negative emotionality.

Dallaire and Weinraub (2007) reported increased internalising but not externalising symptoms in preschool children from insecure attachment at 15 months and stressful life events. Similarly, Shamir-Essakow, Ungerer and Rapee (2005) demonstrated concurrent associations in preschoolers between attachment insecurity, inhibited temperament, maternal anxiety and preschool anxiety. The relation between insecure attachment and child anxiety was significant over and above the effect of maternal anxiety. The authors of both studies considered relations between attachment insecurity and anxiety in children. Hence no conclusions could be drawn with respect to the effects of attachment anxiety or avoidance.

However a direct association between attachment insecurity and internalising or externalising problem behaviours has not been demonstrated consistently in low risk, general population studies (Bates, Maslin & Frankel, 1985; Fagot & Kavanagh, 1990; Goldberg, Muir & Kerr, 1995). Small sample sizes and low levels of problem behaviours have resulted in reduced power to detect main effects of infant attachment insecurity in low risk samples.

One large, low risk, community sample however did find direct effects of attachment insecurity on mother rated CBCL internalising and externalising problem behaviours in three year olds, over and above effects of maternal depression and difficult temperament (McCartney, Owen, Booth, Clarke-Stewart & Vandell, 2004). However as attachment was dichotomised, no conclusions could be drawn with respect to differential outcomes from different attachment strategies of anxiety versus avoidance. There were no significant interactions amongst the attachment security, maternal depression and difficult temperament variables. However researchers have proposed attachment most likely functioned as a moderator of familial risk, particularly in low risk samples, and not as a main effect on the development of child problem behaviours (Dallaire & Weinraub, 2007; DeKlyen & Greenberg, 2008; Sroufe, 2005). Relevant research will be provided in the next section.

5.2.2 Interactions between rearing environment and temperamental risk and infant attachment

Infant attachment may mediate or moderate the effects of stress on the development of toddler internalising and externalising problem behaviours (Gunnar & Cheatham, 2003; Wood, McLeod, Sigman, Hwang & Chu, 2003). There has been some reporting of moderation of the effects from stressful life events and parent psychopathology on the development of problem behaviours by infant attachment (Fortuna & Roisman, 2008; Greenberg, Speltz, DeKlyen, & Endriga, 1991; Pierrehumbert, Miljkovitch, Plancherel, Halfon, & Ansermet, 2000; Shaw & Vondra, 1995).

For example, Kochanska, Aksan, Knaak and Rhines (2004) reported moderation of parent socialisation practices but not a main effect of infant attachment in the development of toddler compliance and conscience. Further, Belsky and Fearon (2002) reported infant attachment avoidance was related to problem behaviours at age 3 years but only for children who experienced adversity. Thompson (2008) concluded the relation between infant attachment and adjustment was mediated by parenting and moderated by family risk. Similarly, Davies and Cummings (1994)

proposed attachment effects operated in conjunction with many interrelated, non-orthogonal developmental risk factors such as marital and parenting factors.

Some researchers have hypothesised attachment may have more influence in the development of internalising than externalising problem behaviours (Dallaire & Weinraub, 2007; Wood, McLeod, Sigman, Hwang & Chu, 2003). For example, Dallaire and Weinraub demonstrated moderation of the effects of stressful life events on the development of symptoms of anxiety, but not aggression, in preschool children by attachment security at 15 months in a large, low risk, population sample.

Research has also supported effects of interactions between infant attachment and temperament on the development of internalising and externalising problem behvaiours. For example, Burgess, Marshall, Rubin and Fox (2003) reported the interaction between infant attachment avoidance and uninhibited temperament predicted CBCL externalising problem behaviours at age 4 years. In a recent small, longitudinal study, attachment insecurity at 18 months but not negative emotionality was found to predict problem behaviours at 30 months (Pauli-Pott, Haverkock, Pott & Beckmann, 2007). Negative emotionality however did moderate the effect of attachment security on the level of problem behaviours. Conclusions from this study were limited by the use of dichotomous measures and total problem behaviours.

However there have been mixed findings, with other studies finding temperament and attachment interactions did not add explained variance in developmental outcomes (McCartney, Owen, Booth, Clarke-Stewart & Vandell, 2004; Vaughn, Bost & Van Ijzendoorn, 2008). Brumariu and Kerns (2010) concluded there was little support for moderation of the relation between attachment anxiety and internalising problem behaviours by infant temperament. Given the accepted position that developmental outcomes are determined by multiple interacting factors (Guttmann-Steinmetz & Crowell, 2006; Wamboldt & Reiss, 2006), it seems likely that limited power has prevented some research from finding attachment and temperament interaction effects.

This may be due in part to the predominant use of dichotomised or discrete attachment classifications. Recently the focus of much attachment research has been on attachment disorganisation in high risk populations. Given that disorganised attachment is rare, around 5%, in low risk populations and that infants rated as disorganised are also rated according to attachment anxiety and avoidance, the focus of discussion in the next section will be on associations between attachment anxiety and avoidance and the development of internalising and externalising problem behaviours.

5.2.3 Summary

There has been substantial research demonstrating associations between insecure infant attachment and child internalising and externalising problem behaviours. Findings have varied according to research design including time between attachment and outcome assessment and inclusion of other risk variables. Support for moderation of the effects or rearing and temperamental risk by infant attachment has been varied. This was surmised to be largely due to limited power from the use of small samples and discrete attachment constructs. The effects of continuous dimensions of infant attachment anxiety and avoidance will be considered next.

5.3 Associations between dimensions of infant attachment anxiety and avoidance and the development of toddler internalising and externalising problem behaviours

As described in earlier chapters, toddler internalising and externalising problem behaviours are presumed to result when the experience of social stressors exceeds their capacity to cope. There may be different pathways to internalising versus externalising problem behaviours as a function of levels of attachment anxiety and avoidance and other risk factors such as parenting stress, family coping and temperamental vulnerability (Bates & Bayles, 1988). Contextual risk factors such as parenting stress do not differentiate in the prediction of internalising versus externalising problem behaviours. Thompson and Raikes (2003) have postulated that

consideration of the different forms of attachment insecurity may increase understanding of developmental outcomes.

There has been little research that has differentiated relations between type of attachment insecurity, anxiety or avoidance, and type of problem behaviours, internalising versus externalising. Some researchers have concluded there are differential outcomes from attachment avoidance versus anxiety. The differential outcome hypothesis purports attachment avoidance leads to the development of externalising problems whereas attachment anxiety has been associated with the development of internalising problems (Cassidy & Berlin, 1994; Rubin, Hymel, Mills, Rose-Krasnor, 1991; Thompson, 2008). Others have associated the use of avoidant coping with internalising problem behaviours (Suls & Fletcher, 1985; Vasey & Dadds, 2001). Infant avoidance of the mother in the Strange Situation has been associated with both internalising and externalising problem behaviours at age 5 years (Pierrehumbert, Miljkovitch, Plancherel, Halfun & Ansermet, 2000). However these associations have been suggested from high risk studies using categorical classifications of attachment and are not conclusive, particularly in low risk populations (Rutter, 1995; Thompson, 2008).

A child with elevated attachment avoidance may deny or suppress any distress, and be reliant on primitive fight or flight responses. Hence, avoidance may lead to defensive, oppositional and self-assertive externalising behaviours or internalising social withdrawal (Pierrehumbert, Miljkovitch, Plancherel, Halfon & Ansermet, 2000). Insecure ambivalent infants may be overwhelmed by emotions and more prone to internalising behaviours involving preoccupation and anxiety or their increased resistance may be associated with angry and oppositional externalising behaviour. Given the high co-occurrence of internalising and externalising problem behaviours discussed in the first chapter, attachment anxiety and avoidance may well be associated with both internalising and externalising problem behaviours. Interactions of attachment with other factors and motivators of behaviour, such as parenting stress and temperament, are likely, consistent with the premise of multifinality (Cichetti & Cohen, 1995; Sroufe, 1983).

Use of stress reducing strategies of attachment anxiety and avoidance is not as clear cut as the attachment classifications imply. Both adults and babies, secure and insecure, have been shown to use a mix of avoidant and anxious attachment strategies at varying levels depending upon the relationship and level of stress. Hence an investigation of the behavioural sequelae of the attachment dimensions would be useful in delineating possible pathways to internalising versus externalising problem behaviours. Mechanisms explaining the associations between attachment dimensions and problem behaviours are still unclear and have not been tested empirically (Goldberg, Muir & Kerr, 1995). Due to small sample sizes, the relatively low prevalence of insecure attachment classifications in the general population, and the predominant use of attachment classifications over dimensions of attachment anxiety and avoidance in attachment research, the differential outcome hypothesis has not been tested extensively.

Consider the A2 baby who is predominantly avoidant but also displays some resistant behaviour and then the C2 baby who may also mix avoidance with resistance but is more resistant than avoidant. Even within the secure classifications there are the B1 and B2 babies who display mild avoidance and the B4 baby who shows some mild resistance. A child may predominantly show one strategy over another but that does not mean there are no signs of the other strategies present. The same is true of adults classified using the AAI. It may be that the relationships between attachment anxiety and avoidance and internalising and externalising symptoms are not as clear cut as the differential hypothesis and categorical analyses have presumed.

5.3.1 Summary

Both infants and adults have been shown to adopt a range of attachment strategies involving both anxiety and avoidance. Discussion explored possible pathways to both internalising and externalising problem behaviours from either attachment anxiety or avoidance. Moderating factors such as rearing environment and temperamental risk may also be influential. These direct and interacting

pathways to toddler problem behaviours using attachment dimensions are yet to be tested. The next sections will expand discussion on the prediction of toddler internalising followed by externalising problem behaviours from attachment dimensions of anxiety and avoidance.

5.4 Exploring the emergence of toddler internalising problem behaviours from infant attachment avoidance versus anxiety

A recent review has concluded equivocal findings regarding the effects of infant attachment on preschool internalising problem behaviours (Brumariu & Kerns, 2010). Some studies did not find any association between infant attachment and internalising problem behaviours (McCartney, Owen, Booth, Clarke-Stewart & Vandell, 2004; Stams, Juffer & Van Ijzendoorn, 2002; Vondra, Shaw, Swearingham, Cohen & Owens, 2001). There was more evidence of associations between attachment insecurity and internalising symptoms in older children and adolescents than in preschool children. This is consistent with models of later onset of internalising than externalising problem behaviours. It is also a result of the paucity of studies investigating internalising problem behaviours in preschool children.

Bogels and Brechman-Toussaint (2006) described possible pathways to internalising problem behaviours from both attachment anxiety and avoidance in infants based on models for the development of anxiety that included perception of control, autonomy and self competence. Anxious infants may have a diminished perception of self competence. This may be due to overprotective parenting in interaction with an inhibited temperament. Avoidant infants may avoid interaction which has been characterised by maternal rejection resulting in a negative self evaluation. Manassis (2001) proposed internalising symptoms may differ amongst anxiously versus avoidantly attached infants. Anxious infants may display more anxiety whereas avoidant infants' behaviour may be characterised by social withdrawal. Depression could result either from feelings of helplessness in an anxious infant or from feelings of hopelessness, being unlovable and alienated in an

avoidant infant. Distinct pathways to internalising problem behvaiours from infant attachment anxiety versus avoidance will be considered in the following two subsections.

5.4.1 Infant attachment anxiety and internalising problem behaviours

Empirical studies have demonstrated greater dependency, passivity and withdrawal by preschoolers and older children who had elevated attachment anxiety in infancy (Belsky & Fearon, 2002; Cassidy & Berlin, 1994; McElwain, Cox, Burchinal & Macfie, 2003; Weinfeld, Sroufe, Egeland & Carlson, 2008). Further, Kochanska and colleagues' studies (2001; 2004) demonstrated the unpredictability and lack of control presumed to underlie attachment anxiety is associated with increased risk of developing internalising problem behaviours. Warren, Huston, Egeland and Sroufe (1997) reported adolescent anxiety disorders were predicted by Strange Situation anxious-resistant classification at age 1 year.

From their review of the anxiety literature, Brechman and Toussaint (2006) concluded heritability and socialisation of anxiety from anxious mothers resulted in anxious infant attachment and the development of anxious symptomatology. Purported moderators of the association between infant attachment anxiety and internalising problem behaviours included parenting stress, compromised parenting, difficult temperament characterised by high behavioural inhibition, and maternal depression (Brumariu & Kerns, 2010). However the direct association of infant attachment anxiety and interactions with these risk factors with toddler internalising problem behaviours have not yet been tested.

5.4.2 Infant attachment avoidance and internalising problem behaviours

Cozolino (2006) proposed avoidant attachment reflected a parasympathetic dominated autonomic nervous system that resulted in social withdrawal, reduced eye contact and emotional expression. He has suggested avoidant children develop a bias towards parasympathetic states that may include lower heart rate, helplessness and decreased activity. These children might present as depressed, withdrawn or

unmotivated. This is a very different picture from the avoidant- externalising link that has been drawn by other researchers.

Internalising problem behaviours indicate a reliance on the self for coping and regulation by avoidance, withdrawal and low approach (Cozolino, 2006). Infants high in attachment avoidance may have given up on using their attachment relationship for co-regulation and rely upon themselves to manage their distress. Thus attachment avoidance may be expected to be associated with internalising problem behaviours. Indeed Lyons-Ruth, Easterbrooks, Davidson and Cibelli (1997) demonstrated subclinical internalising problem behaviours in seven year old children who were avoidantly attached infants. Other studies have also noted associations between attachment avoidance and internalising problem behaviours, particularly depression (Erickson, Egeland, Sroufe, Bretherton & Waters, 1985; Goldberg, Gotowiec & Simmons, 1995; Sroufe, 2005). Brumariu and Kerns (2010) noted associations between attachment avoidance and internalising problem behaviours had been observed predominantly in high risk samples. There has been no research in low risk populations investigating the associations between infant attachment avoidance and internalising problem behaviours in toddlers.

5.4.3 Summary

Most of the research has assumed an association between infant attachment anxiety and internalising problem behaviours. Discussion above explored potential pathways from both infant attachment anxiety and avoidance to toddler internalising problem behaviours. These are yet to be tested.

5.5 Exploring the emergence of toddler externalising problem behaviours from infant attachment avoidance versus anxiety

Externalising problems include behaviours involving noncompliance and aggression. Aggressive behaviour has been described as a defensive response to the frustration of not having one's basic needs met or to a real or perceived threat

(Gauthier, 2003). According to Bowlby's (1973) attachment theory, anger and anxiety resulted from an unavailable attachment figure. Thus infants whose caregivers are unavailable may be more prone to displays of aggressive behaviour resulting from attachment related anger. Gauthier has noted the quality of infant attachment relationships was especially important when toddlers are learning to control self-assertive, often physically aggressive impulses. Both insecure and disorganised attachment have been associated with increased aggression and non-compliance (Greenberg, Speltz, DeKlyen & Endriga, 1991).

In their review of the literature on attachment and externalising disorders, Guttmann-Steinmetz and Crowell (2006) surmised compliance was more likely in secure attachment relationships and that poor supervision and lack of involvement, likely to be more prominent in mothers with elevated attachment avoidance, was associated with greater risk of infants developing externalising problem behaviours. The authors concluded there was some empirical evidence of increased externalising problem behaviours with elevated infant attachment avoidance. However they also noted there had been little research testing this theoretical association. Sroufe (2005) also explained the association between avoidant infant attachment and conduct problems as resulting from interpersonal alienation and anger derived from a caregiving history of emotional unavailability and rejection, and the infant's associated feelings of hopelessness.

However Guttmann-Steinmetz and Crowell (2006) also noted increased infant oppositional and aggressive behaviour towards their mothers had been observed in infants with either elevated attachment avoidance or anxiety. Greenberg, Cicchetti and Cummings (1990) surmised infants were more likely to engage in disruptive behaviour in order to get the attention or control the behaviour of their either authoritarian, likely to be avoidant, or permissive, likely to be anxious, parents. This is consistent with Ainsworth, Blehar, Waters and Wall's (1978) initial observations of noncompliance and more openly expressed anger at home by infants classified as both avoidantly or anxiously attached in the Strange Situation. Thus attachment insecurity may lead to a hostile attributional bias, mistrust, anger and anxiety.

Research supporting pathways from attachment anxiety or avoidance to externalising problem behaviours will be presented in the following two subsections.

5.5.1 Infant attachment anxiety and externalising problem behaviours

Cozolino (2006) has associated anxious attachment with sympathetic ANS dominance which has been associated with irritability, dependency, acting-out and a decreased ability to recover from stress. He suggested the intrusive, overprotective parenting that has been associated with anxious attachment in children is overstimulating and leaves the children undercontrolled. Hence these children experience difficulties with impulse control, hostility and fears of abandonment (Schore, 1994). Focusing on the frustration and anger of not having one's needs met, may also lead to dysregulation (Bowlby, 1973) and the expression of externalising problem behaviours (Guttmann-Steinmetz & Crowell, 2006).

It also seems feasible that an infant high in attachment anxiety may exhibit externalising problem behaviours in attempts characterised by high approach and resistance to gain the attention of their inconsistently available caregiver. There is some empirical evidence to support this. For example, Arend, Gove and Sroufe (1979) noted insecure anxious infants became more oppositional, easily frustrated, angry and distressed as two year olds in a problem solving task. Londerville and Main (1981) reported increased noncompliance in 21 month old toddlers who had elevated attachment anxiety at 12 months.

5.5.2 Infant attachment avoidance and externalising problem behaviours

Some researchers have proposed increased attachment avoidance was more likely to be associated with angry, externalising problem behaviours (Bowlby, 1973; Lyons-Ruth, 1996; Renken, Egeland, Marvinney & Mangelsdorf, 1989). Bowlby observed the avoidant infant may become hostile and aggressive with development. Shaw and Bell (1993) proposed that by 24 months the avoidantly attached infant may have become more bold, noncompliant and negative. Empirical studies have demonstrated greater negative affect, anger and aggression by preschoolers and older children who had elevated attachment avoidance in infancy than children who

exhibited little or no attachment avoidance (Belsky & Fearon, 2002; Burgess, Marshall, Rubin & Fox, 2003; McElwain, 2003; Munson, McMahon & Spieker, 2001; Weinfeld, Sroufe, Egeland & Carlson, 2008). Associations however were more common in high risk samples. In their low risk, middle class sample, Fagot and Kavanagh (1990) concluded other protective factors buffered the relationship between avoidant infant attachment and externalising problem behaviours in preschoolers.

Raine (1996) noted the physiological underarousal characteristic of those with avoidant attachment was associated with the development of antisocial behaviour. Shaw and Bell (1993) surmised noncompliance resulted in avoidantly attached infants due to a lack of motivation to comply with the requests of their unavailable mother. The lack of shared affect and positive relations within the avoidant mother-infant attachment relationship is presumed to interfere with the mother's socialisation and discipline attempts.

Burgess, Marshall, Rubin and Fox (2003) demonstrated moderation of infant attachment avoidance at 12 months and externalising problem behaviours in four year olds by temperamental inhibition at 24 months. Uninhibited infants with elevated attachment avoidance showed the highest externalising problem behaviours at four years. The authors concluded that both attachment and temperament were important in the development of externalising problem behaviours.

5.5.3 Summary

Most of the research has assumed an association between infant attachment avoidance and externalising problem behaviours. Discussion above explored potential pathways from both infant attachment anxiety and avoidance to toddler externalising problem behaviours. Interactions between infant attachment avoidance and uninhibited temperament have been associated with externalising problem behaviours in older children. These are yet to be tested in a low risk population of toddlers.

Thus both theory and research purports associations between dimensions of attachment anxiety and avoidance and the development of internalising and externalising problem behaviours in toddlers. There has been consistent emphasis on the importance of multiple interacting risk factors including attachment, parenting stress and infant difficult temperament. These associations however have yet to be tested empirically as will be highlighted in the following discussion of the limitations of attachment and parenting research.

5.6 Limitations of attachment and parenting research

Attachment research has been criticised for its narrow lens and lack of consideration of alternative explanations for developmental outcomes such as continuity of risk (Lewis, Feiring & Rosenthal, 2000; Thompson & Raikes, 2003). Cumulative risk research however does not provide mechanisms for specificity of outcomes and thus does not advance understanding of developmental processes (Wachs, 1991). The attachment dimensions of anxiety and avoidance have the potential to elucidate mechanisms involved in the development of internalising and externalising problem behaviours. Researchers have recently called for investigations using attachment dimensions rather than the traditional attachment classifications to advance developmental knowledge (Bakermans-Kranenburg & Van Ijzendoorn, 2009; Cowan, Cowan & Mehta, 2009; Hesse, 2008).

Early attachment research adopted a unidimensional and unidirectional model of infant attachment predicting infant adjustment and has been criticised for its lack of transactional or multiplicative models (Cook, 2000). The previous section noted a small effect size in direct effect empirical attachment research indicating the involvement of additional factors and contingencies. Following twenty years of inquiry into the sequelae of early attachments, Thompson (2008) surmised prediction of subsequent behaviour depended upon many factors including the outcome domain, the time span, stability and change in caregiving influence and sample characteristics. Some researchers have credited associations between infant

attachment and subsequent behaviour to the effects of environmental stability and relational continuity (Carlson, 1998; Greenberg, Speltz & DeKlyen, 1993; Kagan, 1979; Lamb, 1984; Lewis, Feiring & Rosenthal, 2000; Thompson & Raikes, 2003; Weinfeld, Sroufe & Egeland, 2000). They have purported associations between attachment and problem behaviours were explained by the same risk factors and thus attachment insecurity acted simply as a risk marker.

Erikson, Egeland and Sroufe (1985) proposed attachment quality was an index of quality of care and support provided in the first year of life and was therefore a predictor of subsequent care. Changes in developmental outcome were explained by changes in care quality and support. Indeed, attachment security has been shown to be relatively stable given environmental continuity (Waters, 2000). Caregiving environment is more stable in low risk, middle class samples and thus, despite the lower incidence of risk and problem behaviours, these may have increased sensitivity to detect attachment effects. There has been some limited research demonstrating early attachment security added to quality of care, environmental continuity and later experience in explaining outcome (Renken et al., 1989; Weinfield, Sroufe, Egeland & Carlson, 2008). However Thompson and Raikes (2003) highlighted the predictive utility of infant attachment over and above the effects of continuity in risk has rarely been demonstrated.

Adaptation is widely accepted to be the joint product of developmental history and current circumstance (Bowlby, 1969; Sroufe, Carlson, Levy & Egeland, 1999). Sroufe (2005) surmised the self organisation from early experience, with attachment at its core, is never lost, no matter how much transformation occurs in later development. However, experimentally, the direct effects of attachment are difficult to separate from the effects of correlated aspects of early and later experience. Similarly, Gallagher (2002) has noted main effects models of parenting and temperament are obsolete as they do not consider the bidirectionality and reciprocity inherent in development. Most research designs have neglected to incorporate both contemporaneous and prior variables in their prediction of infant adjustment. Although bidirectionality, interdependence, circular feedback and the

active role of the child have been accepted conceptually, they have proved difficult to operationalise in research methodology.

More recently, researchers have advocated a cumulative risk, developmental pathways model of development (Belsky, Rosenberger & Crnic, 1995; Cichetti & Rogosh, 1997; DeKlyen & Greenberg, 2008; O'Connor, 2003). According to Greenberg, developmental pathways depended upon the number, type and degree of risk factors, and their developmental timing and sequence. This was consistent with his earlier description of infant attachment as a risk factor and not a main effect in the development of adjustment difficulties. Greenberg, Speltz and DeKlyen (1993), described child characteristics, quality of early attachment relations, parental management/socialisation strategies and family ecology including life stress, trauma, resources and social-support, as four interdependent domains affecting child outcomes. Similarly, Bogels and Brechman-Toussaint (2006) incorporated the interaction of anxious temperament with family factors, such as attachment and family stress, in a transactional model of the development of childhood anxiety.

However, as discussed in the first chapter, cumulative risk models have limited utility in increasing understanding of mechanisms of influence and lack specificity of association with developmental outcomes such as internalising versus externalising problem behaviours. Greenberg, Speltz and DeKlyen (1993) suggested that as a relational measure, mother-infant attachment could be expected to make a unique contribution to the prediction of infant adjustment over and above the effects of parent and child individual characteristics and other parenting management and socialisation processes. The next section will review more recent research that has adopted more sophisticated designs and demonstrated findings of the independent role of infant attachment over and above the effects of environmental continuity and risk.

5.7 Integrative empirical models predicting toddlers' internalising and externalising problem behaviours

Aspects of the rearing environement including parenting stress and the parent-child relationship may increase or decrease a child's temperamental vulnerability to exhibit problem behaviours. Thus interactions among parenting stress, temperament and parent-child relationship constructs can be expected to affect the development of internalising and externalising problem behaviours. Mother-infant attachment has been conceptualised as a central emotional aspect of the mother-infant relationship that has been implicated in the development of self-regulation and internalising and externalising problem behaviours. Sroufe (2005) observed that prediction of subsequent behaviour from early care was improved when attachment was combined with other aspects of the rearing environment such as parenting stress and support.

Whereas robust risk factors such as parenting stress and maternal depression are non-specific in their prediction of problem behaviours (Downey & Coyne, 1990; Lovejoy, Gracyk, O'Hare & Neuman, 2000), attachment avoidance and anxiety have the potential to delineate specific pathways to internalising and externalising problem behaviours. There is a paucity of studies of theoretically driven, integrative empirical models linking infant attachment and normative family stress to specific problem behaviours (McMahon, Grant, Compas, Thurm & Ey, 2003; Dallaire & Weinraub, 2007). This section will review existing integrated research that has demonstrated interactive effects between temperamental vulnerability, attachment and parenting constructs.

5.7.1 Effects of mothering, infant temperament and infant attachment security on child externalising and internalising problem behaviours

Stams, Juffer and van Ijzendoorn (2002), investigated the effects of rearing environment and temperament in a sample of 146 adopted Dutch infants, placed in middle class homes before 6 months of age, on subsequent internalising and externalising problem behaviours at age seven years. Hierarchical regression was

used to predict internalising and externalising problem behaviours from concurrent and early maternal sensitive responsiveness, infant temperament and Strange Situation infant attachment at 12 months. Difficult infant temperament predicted both internalising and externalising problem behaviours at age seven, explaining around 4% of the variance. Attachment security represented by as a unidimensional continuous construct was negatively associated with externalising problem behaviours at age seven. Other than the interaction between disorganised attachment and difficult temperament, no interaction effects were investigated. As the children in this study were adopted and thus had no shared genes with their adopted parents, the effect of attachment security on the prediction of child externalising problem behaviours at age seven can be attributed to quality of the parent-child relationship alone. This provides cogent evidence for the role of the quality of infant-mother attachment in the development of problem behaviours.

Rubin, Hastings, Stewart, Henderson and Chen (1997) used hierarchical regression to predict toddlers' inhibited internalising behaviour from concurrent physiology, fearful temperament, attachment separation distress, maternal responsivity and warmth in a low risk sample of two year olds and their mothers. Child characteristics and aspects of parenting were found to predict toddlers' internalising behavior rather than separation distress per se. Toddlers with persistent inhibition across multiple contexts were found to have a fearful temperament and oversolicitious mothers.

In accordance with prior findings, mothers with elevated attachment anxiety, and not avoidance, would be more likely to be oversolicitous. Thus an interaction between maternal attachment anxiety and temperamental fearfulness could be expected to affect the development of toddler internalising problem behaviours. The relation between attachment distress and internalising inhibition was accounted for by temperamental fearfulness which was entered earlier in the model. This is in accordance with other attachment research which has emphasised the importance of strategies of self-regulation rather than separation distress in infant attachment classification (Cassidy, 1994; Kochanska & Coy, 2002).

In a high risk, low income sample of predominantly single mothers however, no association was found between early maternal stress and early supportive maternal care (Duggal, Carlson, Sroufe & Egeland, 2001). Mother-infant attachment was included as part of the composite early care index. Maternal depression, early care, early maternal support and early maternal stress were all associated with child internalising problem behaviours at age seven years. When all predictors were entered into the regression model, early maternal stress and abuse were the only significant predictors of child internalising problem behaviours at age seven. The authors concluded the results highlighted the importance of the overall family context for the development of internalising problem behaviours and depression in childhood. The study did not include any measures of child temperament nor were any interactions between predictors investigated for moderator effects.

Thus the studies above reported independent effects of parenting, child temperament and attachment on child problem behaviours consistent with the importance of these domains that has been emphasised in this and the preceding chapters. Also consistent with previous research was the varied findings with respect to the effect of attachment over and above rearing environment risk. The attachment constructs used were unidimensional. The next section will present research that adopted a multidimensional continuous maternal attachment construct in their prediction of child problem behaviours.

5.7.2 Predicting child problem behaviours from continuous measures of maternal attachment

In an important landmark integrative study, Cowan, Cohn, Cowan and Pearson (1996) reported separate latent variable path models of kindergarten children's internalising versus externalising behaviours in a small, nonclinical sample assessed using a modified Child Adaptive Behavior Inventory. Significant paths were supported from AAI maternal attachment, marital relations and parenting style assessed two years prior to both internalising and externalising problem behaviours. Maternal attachment was not directly associated with child problem behaviours. An additional direct effect from negative Parent loving to internalising problem

behaviours was the only difference between the internalising versus externalising problem behavior models. More variance was explained in internalising (60%) than externalising (39%) problem behaviours.

Maternal attachment was represented by three continuous latent variables. Maternal attachment security was presumed to be a proxy for maternal emotion regulation, and was represented by the AAI Coherence of transcript scale. Maternal regulation was found to be associated with positive marital relations and positive parenting. Maternal security was indirectly related to child internalising or externalising problem behaviours, mediated by a path from parent loving to positive reported marital relations to positive observed parenting. AAI anger at parent, a SOM scale associated with attachment anxiety and preoccupation, was directly related to both internalising and externalising problem behaviours. Thus marital relations, involving anger, and transcript coherence did not differentiate between subsequent internalising versus externalising problem behaviours.

Although Cowan, Cohn, Cowan and Pearson's (1996) study was limited in its developmental predictive power having a sample size of just twenty-seven, it represented a leap forward in child socioemotional development research and addressed several of the limitations of previous studies discussed earlier. It adopted a longitudinal design and measured the interconnecting relationships between latent parenting, marital relations and attachment constructs in the prediction of child adjustment, using multiple methods and sources of data collection. It was however an exploratory study that did not offer apriori theoretically grounded hypotheses or explanations of the observed relations. Models focused on parent effects and did not consider child effects or bidirectionality of influences amongst constructs. This study did not distinguish different pathways to different types of problem behaviours. Attachment relations were restricted to an investigation of the effects of attachment security and anxiety resulting from preoccupying anger. The effects of attachment avoidance and anxiety resulting from passivity were not explored in this study. The authors were innovative however in their deconstruction of the AAI attachment classifications into their constituent scales.

More recently, Cowan, Cowan and Mehta (2009) reported direct effects of both maternal attachment and marital attachment on internalising and externalising problem behaviours in six year old children. Each construct explained around 10% of the variance in internalising problem behaviours and around 18% of the variance in externalising problem behaviours. Together they explained around 30% of the variance in internalising problem behaviours. Possible influences of child and parent characteristics and sociocontextual factors such as social support and family ecology were not considered in either study. Further, no attempt was made to distinguish attachment anxiety versus avoidance effects. Problem behaviours were assessed in kindergarten and early school aged children and not infants, the focus of this study. However, in this more recent study, maternal attachment was modeled as a unidimensional security construct using the AAI loving and anger scales from the AAI. The next subsection will describe recent child adjustment research that has adopted dimensional measures of infant attachment.

5.7.3 Use of continuous measures of infant attachment to predict child problem behaviours

In a series of studies, Kochanksa and colleagues investigated child, maternal personality, and parenting effects on infant attachment and subsequent emotional development across infancy and toddlerhood from 9 to 33 months of age using a short-term longitudinal study design in a low-risk sample of 108 mother-infant pairs (Kochanska, Coy, Tjebkes & Husarek, 1998; Kochanska, 2001; Kochanska & Coy, 2002; Kochanska, Friesenborg, Lange & Martel, 2004). In accordance with Richters, Waters and Vaughn (1988), the authors generated two continuous scores to represent infant attachment, consisting of an overall security score that distinguished securely- from insecurely-attached infants, and a second score that distinguished avoidant- from anxiously-attached infants. Using multiple regression analyses, the authors reported that infant fearfulness at 9 months was higher for anxiously-attached than avoidantly-attached infants. Different emotion profiles were associated with infant attachment classifications. Infants with elevated attachment anxiety were more fearful and less joyful. Aspects of the mothers' personality found to affect the parent-child relationship included quality of childhood memories, social

trust and neuroticism. Maternal responsivity was found to be an important factor in the development of the parent-child relationship and toddler emotionality. The importance of Kochanska and colleagues' work rests on their efforts to distinguish infants classified as insecurely attached (avoidant) from insecurely attached (anxious) on the basis of both antecedent infant disposition, maternal personality, parenting and subsequent emotional development trajectories.

In addition to beginning to incorporate continuous measures of attachment in research designs, researchers have also begun to disentangle attachment effects on child adjustment from the effects of continuity in rearing environment. Relevant recent studies are presented in the next subsection.

5.7.4 Separating attachment effects from continuity of risk

Belsky and Pasco Fearon (2002a; 2002b) investigated the role of environmental continuity in the prediction of three year olds' CBCL child problem behaviours from infant attachment at 15 months and maternal sensitivity at two years old, using a National Institute of Child Health and Human Development (NICHD) community sample of 1053 mother-infant dyads. Infant attachment was used as a proxy care measure along with maternal sensitivity. Four comparison groups were formed on the basis of continuous or noncontinous care, where continuous care was defined as positive (secure attachment, sensitive mothering) or negative (insecure attachment, insensitive mothering) versus noncontinuous care (secure attachment, insensitive mothering or insecure attachment, sensitive mothering). Consistent positive care was associated with fewer problem behaviours. Infants who had received inconsistent care fared better than those with consistently negative care. Family income, maternal education and family structure (time spent as a two parent family in the first two years), predicted quality and consistency of care. Maternal sensitivity was found to be related to concurrent measurements of maternal depression, stress and social support.

Belsky and Fearon's (2002a) study is important because it represents an initial attempt to consider the effects of environmental continuity on infant socioemotional adjustment. The authors commented on the lack of studies that have attempted to incorporate the well-accepted notion that the effects of early experience on development are moderated by later experience. The study was limited in its scope however due to its lack of consideration of the etiology of infant attachment. Also, improved understanding of the development of infant adjustment could have been gained if analyses had considered the different types of attachment insecurity, which especially given the large sample size, would have been a useful extension. Further, a clearer picture of the effects of environmental continuity on infant adjustment would have been obtained if the covariates and moderating factors, maternal stress, depression and support, had been measured at each of the three time points.

In a second study, Belsky and Fearon (2002b) proposed attachment security moderated the effects of sociocontextual risk on toddler problem behaviours. A cumulative risk index was formed from nine risk variables (average income to needs ratio; maternal education; maternal depression; parenting stress; social support; marital quality; maternal psychological adjustment; family structure status; minority status). Hierarchical regression analysis revealed main effects of infant attachment security, cumulative risk and their interaction. However cumulative risk accounted for substantially more variance in problem behaviours than infant attachment (12% versus less than 1%) and overall the authors' cumulative risk regression model accounted for only a small proportion of the child problem behaviour variance. Common method variance may have inflated the relationship between risk and behaviour problems. Further, as risk measurements were taken at five time points (1, 6, 15, 24 and 36 months) compared with infant attachment being measured just once at 15months, it is also possible further inflation may have resulted from the contributions of the recent 24 and 36 month risk assessments.

Belsky and Fearon (2002b) found that at low or high risk levels, there were no differences in levels of problem behaviours between infant attachment groups. At moderate risk however, the avoidantly-attached infants exhibited significantly more

problem behaviours. Thus attachment effects were dependent upon risk level. The adoption of a cumulative risk model represented a leap forward in infant adjustment research methodology. However the small proportion of variance explained by the model is a source of concern and indicated that further attention to the definition of risk and formation of the risk index was warranted. Further, the lack of specificity of prediction from composite constructs has been discussed earlier.

5.7.5 Interactions of attachment, parenting and temperament constructs

Parenting and attachment have been shown to moderate the effects of temperament on the development of self-regulation and empathy (Keenan & Shaw, 1994; Kochanska, 1995; Zahn-Waxler, Radke-Yarrow, Wagner & Chapman; 1992). Further, attachment security has been shown to mediate the effect of maternal depression and stress on the development of toddler problem behaviours (Carter, Garrity-Rokous, Chazan-Cohen, Little & Briggs-Gowan, 2001). From her review of the literature, Gallagher (2002) proposed attachment may mediate or moderate main effects of parenting and temperament on child adjustment. She emphasised the importance of developmental models incorporating interactions amongst person effects such as temperament, process effects such as parenting and attachment, and conditional effects of differential susceptibility. Thus recent research has begun to demonstrate interaction effects amongst parent, child and relationship characteristics on the development of child problem behaviours.

Dallaire and Weinraub (2007) improved on previous studies by examining the interactive effects of Strange Situation attachment security at 15 months and contextual stress on preschoolers' anxious and aggressive problem behaviours over and above the effects of prior symptom level, in a large, NICHD population sample. Contextual stress was represented by the experience of negative life events. The authors aimed to model the development of purer forms of anxiety and aggression and excluded more general problem behaviours such as somatic complaints, withdrawal and delinquency. Children assessed as disorganised were omitted to enable a focus on the effects of attachment security and insecurity. Multiple informants provided CBCL outcome measures.

Dallaire and Weinraub (2007) found concurrent negative life events and the interaction between negative life events and attachment security at 15 months were significant predictors of preschoolers' anxiety at 4.5 years, over and above earlier anxiety at 3 years. Concurrent maternal sensitivity, income, and negative life events, were significant predictors of preschoolers' aggression, over and above earlier aggression at 3 years. Effects over and above earlier symptom levels were small however the authors reminded us that small effects were not negligible effects (Prentice & Miller, 1992). The interaction of negative life events and attachment security did not predict preschoolers' aggression. There were no direct effects of attachment security on preschoolers' anxiety or aggression over and above effects of maternal sensitivity, income, gender and earlier symptom levels. Findings provided support for the specific role of attachment insecurity in the development of anxiety but not aggression under conditions of high contextual stress. Given the large sample, it is a shame the study did not investigate more specific effects of attachment anxiety versus avoidance.

In a series of studies, Eisenberg and colleagues' (Eisenberg et al., 2010) adopted a three stage longitudinal developmental cascade methodology to investigate unfolding relations between aspects of child temperament, parenting and internalising and externalising problem behaviours in a low risk sample of children aged 18, 30 and 42 months. They found that once stability of constructs over time and within time covariation between constructs were taken into account, longitudinal relations amongst constructs were no longer significant. In other words, once early levels of constructs were taken into account, little additional variance was explained by subsequent assessments. Developmental cascade models incorporate the effects of earlier and concurrent levels of developmental constructs and reflect their unfolding and interconnection over time. The complexity of these models however may result in limited power to detect real world across time relationships between constructs.

5.7.6 Summary

Research reviewed above has begun to close some of the gaps in parenting and attachment research on the prediction of toddler internalising and externalising problem behaviours highlighted in the preceding review chapters. There are more studies investigating effects of attachment constructs with rearing environment and temperamental risk. However despite acceptance of interactions amongst developmental constructs, relatively few studies included interactions in their research designs. There have been no reported studies investigating attachment effects on infant development where attachment is represented as a continuous two dimensional construct as introduced in chapter four. Cumulative risk has been shown to explain significantly more variance than infant attachment. Interactions between infant attachment and rearing environment risk have been supported in some studies. More complicated designs incorporating the effects of earlier and concurrent experience on the development of problem behaviours have highlighted the importance of early risk and model parsimony.

5.8 Gaps and hypotheses arising from the literature

The attachment literature has largely assumed associations between infant attachment anxiety and internalising problem behaviours and infant avoidance and externalising problem behaviours. These assumptions remain largely untested. Empirical investigations in chapter seven will explore these assumptions and test possible alternative hypotheses presented in the discussions above. These include possible associations between infant attachment anxiety at 12 months and toddler externalising problem behaviours and between infant attachment avoidance at 12 months and toddler internalising problem behaviours.

Direct effects of maternal attachment on toddler problem behaviours have rarely been investigated. Further, discussion in this chapter highlighted the literature has largely ignored theoretically possible differential effects of different attachment avoidance strategies such as idealisation versus derogation or anxious strategies such as passivity versus involving anger. The current study will address this gap by

exploring empirical relations between different strategies of maternal attachment anxiety and avoidance and toddler internalising versus externalising problem behaviours.

Missing from the body of knowledge on the development of toddler internalising and externalising problem behaviours are investigations of the effects of interactions and transactions between parenting stress and infant attachment. Chapter seven will address this gap by the exploration of possible direct versus mediated or moderated effects of infant attachment by parenting stress on toddler problem behaviours. Prior problem behaviour research has also been criticised for its lack of simultaneous consideration of past and contemporaneous factors. This limitation will be addressed in empirical investigations in chapter seven. These will explore possible direct and interactive effects of early risk factors with concurrent parenting stress on toddler problem behaviours.

5.9 Summary and conclusions

Discussion has highlighted the increased predictive utility of continuous dimensions of attachment anxiety and avoidance over traditional research using discrete attachment constructs. Both maternal and infant attachment anxiety and avoidance have been presented as relationship constructs with the potential to describe specific pathways to toddler internalising versus externalising problem behaviours. Discussion supported the widely held differential hypothesis of associations between attachment anxiety and internalising versus attachment avoidance and externalising problem behaviours respectively. Alternative pathways between attachment anxiety and externalising and attachment avoidance and internalising problem behvaiours were also presented as feasible and awaiting empirical demonstration.

The studies described in this last section of this chapter have made unique contributions to current understanding of the prediction of infant adjustment from attachment, temperament and parenting variables in sociocultural context in the general population. Contributions include the use of covariance structure modeling

of pathways from maternal and infant attachment to toddler adjustment; greater integration across attachment, family and temperament domains; incorporation of cumulative risk; investigation of the effects of interactions between rearing environment, temperament and attachment constructs; and the consideration of the effects of environmental continuity on infant development.

However, apart from the studies conducted by Kochanska and colleagues, researchers have not yet investigated the delineation of different developmental pathways from different attachment strategies. Research designs have continued to model attachment as a unidimensional security construct and thus have precluded a more thorough investigation of the possible pathways from attachment anxiety versus avoidance to toddler internalising and externalising problem behaviours. This is an important limitation and represents a significant gap in the knowledge. The differential outcome hypothesis has not been tested in the infant literature.

There are other limitations of studies of infant adjustment. Some studies are limited in scope, either focusing on the prediction of infant attachment or toddler adjustment but not often including both in the same study. Alternatively they may have given limited attention to sociocontextual influences of rearing environment risk or neglected the role of maternal attachment or infant temperament. Further, until recently, few studies have attempted to consider simultaneously the effects of earlier and concurrent experience and environmental continuity on infant development. Thus, this review has demonstrated conclusions from previous attachment and parenting research on the development of toddler internalising and externalising problem behaviours have been limited by scope, inadequate study designs, and reduced statistical power due to small sample sizes and the use of categorical measures of attachment.

The next empirical chapter will begin to address some of these limitations by investigating the development of parenting stress from early maternal attachment anxiety and avoidance, difficult temperament, maternal depression and marital relations using a longitudinal path analysis model.

Chapter 6

Investigation 1: Pathways to parenting stress across infancy from family, maternal, child and attachment variables

Chapter 6 Investigation 1: Pathways to parenting stress across infancy from family, maternal, child and attachment variables

6.1 Introduction

Discussion in chapters two and three highlighted relations between parenting stress and the development of child problem behaviours. As reviewed in chapter three, mothers' parenting stress from daily hassles and stressful life events has been shown to have high stability across the preschool period (Crnic, Gaze & Hoffman, 2005). Chronic stress can be presumed to have more disruptive effects on child development than short term, moderately stressful events. Gaps in parenting stress research indicated in chapter three included a lack of theoretical models (Östburg & Hagekull, 2000), little longitudinal research particularly in infancy and in low risk populations (McMahon, Grant, Compas, Thurm & Ey, 2003), a lack of integration across the parenting stress and attachment literature, and a lack of investigations involving different types of parenting stress (Coyle, Roggman & Newland, 2002; Grant et al., 2003). Thus, little is known of the course and determinants of different types of parenting stress across infancy.

Mothers' parenting stress in this study was defined in chapter three as self reported subjective distress, including negative feelings and beliefs toward the self and child, arising from the parenting role (Deater-Deckard, 2004). Abidin's Parenting Stress Index was the stress measure used in this study (PSI; Abidin, 1995). The child domain of the PSI has been conceptualised as parent-child stress involving parent reported stress arising from within the parent-child relationship. The parent domain has been conceptualised as parent-other stress involving parent reported stress arising from the parent's relationships with others, including with herself.

As highlighted in chapter three research has yet to investigate potential differential pathways to parent-other versus parent-child stress. Parent-child stress may be more affected by proximal factors within the mother-infant relationship such as maternal

depression, maternal and infant attachment anxiety and avoidance and infant difficult temperament. Infant temperament may be less influential in determining parent-other stress than parent-child stress. Further, parent-other stress may be relatively more affected by sources of stress from relationships outside the mother-infant relationship such as positive and negative marital relations.

6.1.1 Associations between maternal and infant attachment anxiety and avoidance and parenting stress

The literature review chapters described associations between both attachment anxiety and avoidance, cognitive and emotional biases and variation in giving and seeking support, and parenting stress. The importance of regulation and coping skills for effective stress management was discussed in chapter two. Chapter four included a discussion on the emotion regulation restrictions associated with attachment anxiety and avoidance. Affective suppression, disengagement from interactions with attachment partners and defensive shifts away from attachment related threats have been reported for adults with elevated attachment avoidance. Negative views of self and others, heightened attachment related distress and negative affect in interaction with attachment partners have been demonstrated for adults with elevated attachment anxiety. Elevated maternal attachment anxiety and avoidance have been linked to increased parenting stress. Thus, maternal attachment anxiety and avoidance, conceptualised in chapter three as stress management strategies, are included in the path model predicting parenting stress in infancy.

Mothers' stress reducing strategies are expected to vary according to their levels of attachment anxiety and avoidance. As discussed in chapter four, elevated attachment anxiety has been associated with chaotic, inconsistent caregiving, preferential attention to negative emotions and a negative self view. Mothers with elevated attachment anxiety are also more likely to report difficulties and therefore are expected to report higher levels of negative marital relations, depression and temperamental difficulty in their child. This in turn is expected to be associated with higher levels of maternal reported parenting stress in both the parent and child domains. Mothers with elevated attachment avoidance are presumed to dismiss or deny negative feelings and thus are expected to be less likely to report difficulties such as negative marital relations, depression and temperamental

difficulty in their child. This in turn is expected to be associated with lower levels of reported parenting stress in both the parent and child domains. However, consistent with the diathesis-stress model, Fortuna and Roisman (2008) observed increased reporting of psychopathology symptoms in adults with insecure levels of attachment anxiety and avoidance. Further, as noted in chapter four, increased parenting stress has also been associated with avoidant strategies. Thus the relation between attachment avoidance and parenting stress remains unclear.

Chapter four presented research demonstrating a small relation between parenting stress and infant attachment security. This chapter will investigate the effect of infant attachment on the development of parenting stress. Zelenko et al. (2005) reported higher stress, measured as accelerated heart rate, in mothers of insecure infants with elevated attachment anxiety during the Strange Situation reunion episodes. Research presented in chapters three and four has reported concurrent associations between maternal depression, infant attachment security and parenting stress. Note that prior research has reported associations between global attachment security and parenting stress. No prior studies however have investigated separate relations between parenting stress and dimensions of infant attachment anxiety and avoidance.

Elevated infant attachment anxiety has been characterised by dependency, clingy behaviours and poor self control, and thus can be expected to be associated with increased parent-child stress and perhaps have flow on effects to parent-other stress. Elevated infant attachment avoidance has been associated with dissociated anger and externalising problem behaviours and thus may also result in elevated parenting stress. Conversely, attachment avoidance may be associated with a redirection of attention away from the mother-infant relationship and towards the environment in order to minimise distress from rejection or risk upsetting a volatile and harsh mother. In this case, infant attachment avoidance may be associated with lower mother reported parent-child stress due to fewer interactions with her infant. Thus the direction of influence from infant attachment avoidance to parent-child and parent-other stress is not apparent and awaits empirical demonstration. It is likely the level of avoidance in conjunction with other parenting stress risk factors will determine the net direction of the effect of infant attachment avoidance on

parenting stress. Infant attachment may also mediate pathways from maternal attachment to parenting stress. Discusssion in chapter four presented research and theory supporting both protypical and compensatory paths between dimensions of maternal and infant attachment anxiety and avoidance. These are yet to be tested empirically.

6.1.2 Associations between maternal depression, marital relations, infant difficult temperament and parenting stress

Stress reactivity and regulation were described in chapter two as reflecting genetic predisposition, formational childhood and current interpersonal experiences. In this study, maternal attachment anxiety and avoidance are presumed to reflect genetic predisposition and formational childhood experiences. Marital relations, infant attachment anxiety and avoidance and a mother's perception of her child's difficult temperament represent the contribution from current interpersonal relations to a mother's parenting stress. Maternal depression can be viewed as representing a combination of all three types of influences, including genetics and past and current relationship experiences.

Relations between maternal depression and parenting stress are widely accepted. Research presented in chapter three also demonstrated maternal depression was interrelated with maternal attachment and marital relations. Thus relations between maternal attachment and marital relations with parenting stress can also be expected. In accordance with Belsky's (1984) determinants of parenting model, and recent work demonstrating coherence across attachment history and marital working models (Dickstein, Seifer & Albus, 2009; Roisman, Madsen, Hennighausen, Sroufe & Collins, 2001), it is hypothesised maternal attachment anxiety and avoidance may affect marital relations and maternal depression which in turn affect parenting stress in the parent domain. Positive marital relations are presumed to reduce parenting stress whereas negative marital relations are expected to contribute to parenting stress.

Prior research has concentrated on the maladaptive effects of negative marital relations. There has been very little research investigating the potential buffering effects of positive marital relations. Positive marital relations may buffer the negative effects of maternal attachment anxiety and depression on parent-other stress. However there may be

no relation observed between positive marital relations and parenting stress in a low risk population due to higher maternal resources and lower parenting stress. Buffering of risk factors by positive marital relations in a low risk population awaits empirical investigation and will be undertaken in this study.

It has been suggested that a mother's stress is more likely to be affected by her relationship with her child than with her spouse particularly with mothers of younger children. Thus marital relations may not be as influential in determining parenting stress as other child factors such as difficult temperament. As discussed in chapter two, difficult temperament in children from around two years of age has been associated with increased parent-other and parent-child stress. There is less temperament and parenting stress research in mothers of infants under two years of age. One study however demonstrated parenting stress was highest in depressed mothers of difficult infants (Gelfand, Teti & Fox, 1992).

Infant difficult temperament has been assessed in this study by three scales of *Uncooperation/ unmanageability*, *Irritability* and *Unapproachability/ unadaptability* in the SITQ. Items on the *Uncooperation/unmanageability* scale assess the child's resistance to daily tasks involving interaction with the parent, such as face wiping. *Irritable* infants are upset more easily, have more intense reactions and can be expected to take longer to return to a calm state after being upset. The *Unapproachable/ unadaptable* scale includes items assessing the parent's perception of their infant's adaptability to novelty. High infant withdrawal from, and distress with, novelty can be expected to be more challenging behaviour for mothers to manage and thus may be associated with increased parenting stress. Hence behaviour captured by all three difficult temperament scales would appear to contribute to parenting stress. Thus this study will utilise difficult temperament as a global construct.

Chapter three highlighted there have been mixed conclusions with respect to the relative influences of maternal sources of parenting stress, such as from maternal depression, marital relations and maternal attachment, compared with child sources, such as difficult temperament. Prior stress research has been dominated by concurrent research

designs which have precluded causal conclusions. This study adopted a longitudinal design to investigate the relative contributions of these constructs assessed when the infant was 4 months old on maternal reported parent-other and parent-child stress assessed when the infant was 12 months of age. A longitudinal design enabled stronger conclusions regarding relations between constructs than those drawn from a concurrent study.

6.1.3 Path model predicting maternal reported parent-other versus parent-child stress in low risk mothers of 12 month old infants

Figure 6.1 represents hypothesised paths to mothers' parent-other and parent-child stress when their infants were 12 months old from maternal attachment anxiety and avoidance, maternal depression, positive and negative marital relations and infant difficult temperament assessed when infants were 4 months old and concurrent infant attachment anxiety and avoidance. The parent domain of the PSI (Abidin, 1995) will be used to assess parent-other stress arising from aspects of parent functioning outside the mother-child relationship. Parent-child stress will be measured using the child domain of the PSI. In accordance with earlier stress and parenting models (Abidin, 1976; Belsky, 1984), it is hypothesised parent-other and parent-child stress in mothers of 12 month old infants in a low risk population will be predicted directly by maternal and infant attachment anxiety, negative marital relations, maternal depression and infant difficult temperament as depicted in Figure 6.1. Negative direct paths are hypothesised from maternal and infant attachment avoidance and positive marital relations. Difficult temperament is expected to be more influential in determining parent-child than parent-other stress. Positive and negative marital relations are expected to have a greater effect on parent-other than parent-child stress.

According to the attachment prototype hypothesis described in chapter four, one's childhood relationship with one's own parents serves as a prototype for all future relationships. Thus, a mother's state of mind with respect to her childhood relationship with her parents is presumed to affect her relationship with her infant and with her spouse. Hence, the path model included paths from maternal attachment anxiety and avoidance to negative marital relations, maternal depression and infant attachment anxiety and avoidance. Paths from maternal attachment anxiety to infant attachment avoidance and

vice versa were also included to test the compensatory attachment hypothesis presented in chapter four. In addition to maternal attachment and avoidance, difficult temperament was included at the start of the model as an influential child characteristic that can be expected to have feed forward effects on negative marital relations, maternal depression and parent-other and parent-child stress.

Avoidant attachment strategies involve ignoring or minimising negative interactions and having an idealised positive stance. Thus, mothers who adopt avoidant attachment strategies are expected to be less likely to report negative marital relations and more likely to report higher positive marital relations. Anxious maternal attachment would be expected to be associated with higher self reported negative marital relations and lower self reported positive marital relations. Paths between the maternal attachment and marital relations constructs in the model reflect these expectations.

Maternal attachment avoidance is expected to be a negative predictor of maternal reported negative marital relations and maternal depression. There may also be indirect pathways to parenting stress from maternal attachment anxiety and avoidance mediated by maternal depression, positive and negative marital relations and infant attachment anxiety and avoidance respectively. Maternal and infant attachment avoidance and positive marital relations may either reduce or be unrelated to parent-other and parent-child stress in a low risk population of mothers of infants in their first year. Positive marital relations may or may not act as a stress buffer.

It was noted in chapter two that maladaptive effects of maternal attachment anxiety and negative marital relations may only occur under conditions of elevated stress. Stress levels in low risk populations may not be sufficiently elevated for the predicted relations. That is relations may be moderated by parenting stress. This chapter will investigate whether the predicted paths to parent-other versus parent-child stress from maternal attachment anxiety and avoidance, maternal depression, negative and positive marital relations and infant difficult temperament, attachment anxiety and avoidance, exist in a low risk population of mothers with one year old infants.

It is not known whether similar pathways exist to parent-other versus parent-child stress. Factors directly related to the parent-child relationship such as maternal attachment anxiety, maternal depression and infant difficult temperament may be more influential in determining parent-child stress than less proximal factors such as marital relations. Alternatively it may be in accordance with prior research, that maternal factors are more influential than child factors regardless of the stress domain. This chapter will investigate pathways to parent-other versus parent-child stress in mothers of 12 month old infants in a low risk population. Differential pathways are expected to involve a greater influence of negative marital relations and a lesser influence of infant difficult temperament and infant attachment anxiety and avoidance in parent-other versus parent-child stress.

6.2 Method

6.2.1 Participants

161 mothers and their newborn infants were recruited from the Ballarat and Melbourne communities over a two year period. Sixty two mothers were recruited through the Maternal and Child Health centres in Ballarat, a regional University town, either by responding to flyers posted at the centres or by personal invitation from the student investigator at mothers' groups held at the centres. Twenty seven mothers enrolled in the Ballarat Child and Family Services Day Stay program for help with infant settling difficulties, consented participate in the Study. The remaining seventy two mother-infant pairs were recruited directly through the post natal wards of two major city hospitals; forty one dyads were from a Ballarat hospital and thirty one from a large Melbourne hospital.

Potential participants were provided with a plain language statement (Appendix 1) outlining details of the Study and given the opportunity to ask any questions regarding their participation. The mothers were advised they were free to withdraw from the Study at any time and asked to provide formal written consent to participate (Appendix 2). All consenting participants were included in the Study.

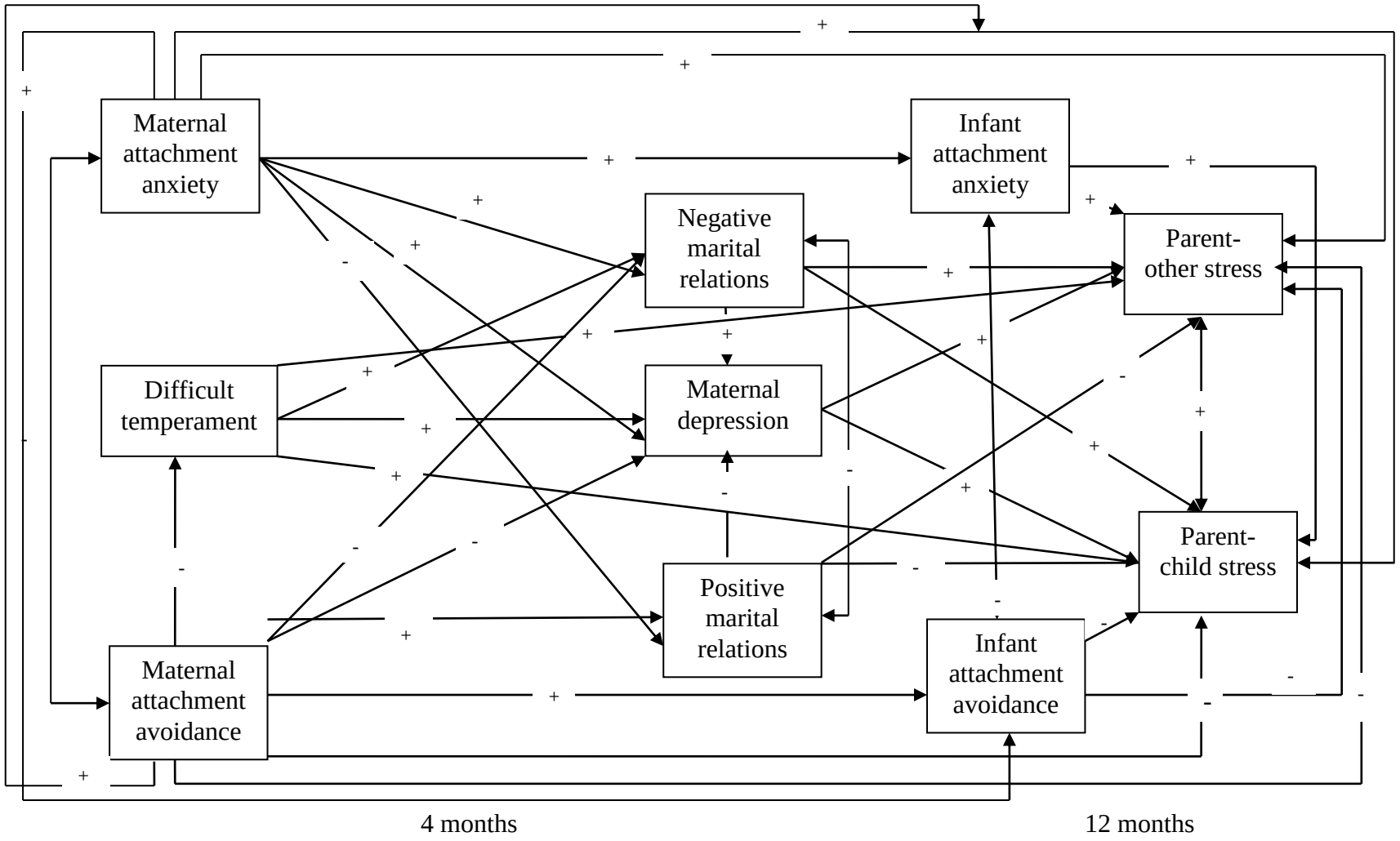

Figure 6.1 Hypothesised path model predicting mothers' of 12 month old infants parent-other and parent-child stress arising from maternal attachment anxiety and avoidance, maternal depression, positive and negative marital relations and infant difficult temperament measured when infants were 4 months old and concurrent infant attachment anxiety and avoidance

When infants were 4 months old, 137 mother-infant pairs participated in the study. The remaining twenty four mothers were unable to be contacted. When the infants were 12 months old the sample comprised 123 from the original 137 mother-infant dyads. Six participants had withdrawn from the study citing time constraints and eight participants were unable to be contacted. All analyses in this chapter will be conducted using the 123 mother-infant dyads who participated in both the 4 and 12 month stages of the Study.

At 24 months, 48 mother-infant pairs participated in the study however data was incomplete for one participant reducing the sample size for analyses at this stage of the study to 47. The number of participants at 24 months was significantly lower than at 4 and 12 months. Three participants had withdrawn from the study due to time constraints and four questionnaire packages were returned due to a change of address. The remaining sixty eight of the 123 participants from the 12 month stage did not return their questionnaire packages. Previous data collection when infants were 4 and 12 months had involved direct contact between the researcher and the participants. This had also been planned to occur at the 24 month stage. However changed circumstances prevented data collection to proceed as planned at this stage. Instead questionnaires were mailed to participants when their infants were 24 months old. Lack of direct contact and follow up as well as some study fatigue are the likely explanations for the significant decrease in numbers in the study from 12 to 24 months.

6.2.2 Measures when infants were 4 months old

6.2.2.1 Background measures

Background measures included in this study were collected by questionnaire (Appendix 3). They include maternal age, maternal education, number of older siblings, family income, relationship length, infant gender, mother-child separation (hours per week), other regular carers (type and hours per week), maternal employment (hours per week), maternal alcohol consumption (glasses per week), maternal cigarettes smoked (per week), maternal medication and history of mental illness.

Participants' and their spouses' occupations were classified according to the Australian Standard Classification of Occupations Second Edition (ASCO; Australian Bureau of Statistics, 1997) and compared against the National Standard. The Standard has nine major hierarchically organised occupational categories defined by relevant skills and specialisations. In decreasing order, they are managers and administrators (coded 1), professionals (coded 2), associate professionals (coded 3), tradespersons (coded 4), advanced clerical and service workers (coded 5), intermediate clerical, sales and service workers (coded 6), intermediate production and transport workers (coded 7), elementary clerical, sales and service workers (coded 8), and labourers (coded 9). Mothers were asked to provide their occupation prior to the birth of their child.

6.2.2.2Maternal attachment anxiety and avoidance

Maternal attachment anxiety and avoidance was measured using the *Adult Attachment Interview* (AAI). It is a semi-structured audio-taped interview of approximately one and a half hours duration during which participants are asked to provide recollections of childhood experiences with their parents. Judgements are made on several nine-point scales representing the respondent's probable attachment experiences with their mother and father (*rejecting, involving/reversing, pressure to achieve, neglecting and loving*); current state of mind with respect to their attachment experiences with their mother and father (*idealising, involving anger, derogation, insistence on lack of recall, passivity of thought processes, fear of loss, unresolved loss and unresolved trauma*); and overall coherence (Crowell, Fraley & Shaver, 2008). State of mind (SOM) scale scores greater than or equal to 5 indicate elevated levels of insecure attachment strategies and would generally warrant placement in an insecure AAI classification. SOM scores less than 5 would generally warrant an autonomous classification.

Each interview is traditionally classified according to a three way classification scheme as representing either a dismissing (avoidant), preoccupied (anxious), or autonomous (secure) state of mind with respect to attachment and assigned one or two sub-categories according to coding protocol (Main, Goldwyn & Hesse, 2002). Four way classifications

include a judgement with respect to resolution of loss or trauma. Some interviews with conflicting scale scores, such as high idealisation of one parent and high involving anger with the other, may be judged to be unclassifiable (Crowell, Fraley & Shaver, 2008; Hesse, 2008). Meta analyses have demonstrated a three way AAI classification distribution of around 58% autonomous, 24% dismissing and 18% preoccupied in nonclinical populations (Bakermans-Kranenburg & van Ijzendoorn, 1993; van Izjendoorn & Bakermans-Kranenburg, 2006; 2008).

Categorisation of a person's current state of mind with respect to attachment is made on the basis of the Probable Experience, Current SOM and Coherence scale scores, as well as on consideration of global aspects of the text (Main & Goldwyn, 1994). Adult attachment classifications using the AAI have been shown to be stable across interviewer and time (van Ijzendoorn, 1995; Crowell et al., 1996; Hesse, 2008). Stability in three-way classifications (avoidant, secure, preoccupied) has ranged between 78% and 95% in low risk samples (Benoit & Parker, 1994; Crowell et al., 1996; Sagi et al., 1994; van Ijzendoorn, 1995; Bakermans-Kranenburg & van Ijzendoorn, 1993). The AAI has been shown to have good construct and discriminant validity (Hesse, 1999). It is unrelated to social desirability, social adjustment, general personality measures, intelligence, non-attachment related memory and subject material (Bakermans-Kranenburg & van Ijzendoorn, 1993; Crowell et al., 1996; Crowell, Fraley & Shaver, 2008; van Ijzendoorn & Bakermans-Kranenburg, 1996; van Ijzendoorn, 1995).

More recently, researchers have demonstrated through principal component analysis and taxonometric methods, that adult attachment state of mind may be best represented as two latent orthogonal continuous dimensions, conceptualised as attachment-avoidance and attachment-anxiety (Bernier, Larose, Boivin & Soucy, 2004; Larose, Bernier & Soucy, 2005; Fraley & Waller, 1998; Griffin & Bartholomew, 1994; Haydon, Roisman & Fraley, 2011; Haydon, Roisman & Burt, 2012; Roisman, Fraley & Belsky, 2007). Haydon, Roisman and Fraley reported discriminant validity of the AAI attachment dimensions.

In the current study a principal components analysis of the state of mind scales will be used to help determine which scales relate to dimensions of maternal attachment avoidance versus anxiety. Use of the continuous SOM scores enables increased power and additional investigations than with the traditional attachment classifications.

6.2.2.3Infant temperament

Infant temperament will be assessed along an easy-difficult continuum using the 30-item, parental-report, *Short Infant Temperament Questionnaire* (SITQ; Sanson, Prior, Garino, Oberklaid & Sewell, 1987). The SITQ was formed from Carey and McDevitt's (1978), Revised Infant Temperament Questionnaire in a large (N=2443), representative Australian sample. Parents are provided with 30 statements of infant behaviour and are asked to rate each statement according to how well it describes their infant's recent and current behaviour on a 6-point scale ("almost never" = 1, "not often" = 2, "usually does not" =3, "usually does" = 4, "frequently" = 5, "almost always" = 6). Negative items are reverse scored. Items form five scales of *unapproachabilty/ unadaptability, rhythmicity, uncooperative/ unmanageable, active/ reactive* and *irritable*.

The SITQ has good test-retest reliability over two to nine weeks (*unapproachable/ unadaptable*, .90; *rhythmicity*, .79; unc*ooperative / unmanageable*, .81; *active/ reactive*, .77; and *irritable*, .77), and internal consistency (un*approachability/ unadaptability*, .76; *rhythmicity*, .71; *uncooperative / unmanageable*, .63; *active/ reactive*, .57; and *irritable*, .64). All five factors were significantly correlated with concurrent behaviour problems, and together, explained 32% of the variance.

The *unapproachable/unadaptable* factor consists of items describing infant behaviour as unaccepting of change, wary and shy with respect to unfamiliar situations and people (Items 2, 3, 8, 12, 16, 23 and 29). The *rhythmicity* factor assesses regularity of feeding, sleeping and activity (Items 9, 17, 19, 21, 24 and 26). The *uncooperative/ unmanageable* factor consists of items that describe difficult infant behaviour such as fretting, crying and

squirming during regular activities such as feeding and changing (Items 4, 7, 10, 22, 28 and 30). The *active/reactive* factor relates to an infant's level of activity, expression and persistence (Items 6, 11, 14, 15, 20 and 25). The *irritable* factor describes general fretful and moody infant behaviour that is present across most situations including when the infant is left to play on their own (Items 1, 5, 13, 18 and 27). Factor scores are the mean of the item scores loading onto that factor.

A difficult temperament score will be derived from the mean of the *unapproachable/ unadaptable*, *uncooperative/ unmanageable* and *irritable* SITQ scores in accordance with Sanson, Prior, Garino, Oberklaid and Sewell (1987). The higher the score the more difficult the infant has been judged to be by his or her mother. This composite score of difficult temperament has been shown to be associated with maternal and nurse ratings of infant problems such as colic, sleep, crying (Sanson, Prior, Garino, Oberklaid & Sewell). Infants with difficulty scores one standard deviation above the mean are identified as *Difficult*, and one standard deviation below the mean as *Easy*, in accordance with Carey and McDevitt (1979). This study will use the continuous difficult temperament score as well as the individual *unapproachable/ inadaptable, uncooperative/ unmanageable* and *irritable* SITQ scores.

6.2.2.4Maternal depression

Maternal depression was assessed using the widely used and validated Center for Epidemiological Studies Depression Scale (CES-D, Radloff, 1977). The CES-D is a 20-item self-report questionnaire that provides a measure of psychological adjustment in the general population. Participants are asked to rate on a four-point Likert scale (0= "rarely", 1="sometimes", 2="occasionally", 3="most of the time"), how often in the past week they have felt according to each statement reflecting depressive symptomatology (e.g. "I did not feel like eating: my appetite was poor."). Four items (Items 4, 8, 12 and 16), are reverse scored. A total depression score is formed from the sum of the individual item responses, ranging from 0 to 60, with higher scores indicative of higher levels of depressive symptomatology. The CES-D shows good sensitivity and specificity with scores greater than 16 suggesting potential referral for further assessment.

The CES-D was initially validated in a nonclinical, community sample of 2514 white, US adults and subsequently, in a sample of 1060 white US adults (Radloff, 1977). It has high internal consistency (α=.85 - .92), test-retest reliability ranging from .4 to .7, and good convergent and discriminant validity (21% of the nonclinical sample were above the cutoff score of 16, compared with 70% of the psychiatric patients; Cole, Rabin, Smith & Kaufman, 2004; Radloff, 1977). McCallum, Mackinnon, Simons and Simons (1995) reported unidimensionality of the CES-D in an Australian community sample of older adults aged over 60 years.

6.2.2.5Positive and negative marital relations

Marital relations was assessed using the 25-item self report Relationship Questionnaire (RQ; Braiker & Kelley, 1979). Participants were asked to rate 25 statements describing their relationship on a nine-point scale (1 = "not at all" to 9 = "a lot"). The questionnaire assessed mothers' feelings of love toward their partners ("To what extent do you love your partner?"; Items 1, 4, 7, 10, 13, 16, 17, 19, 21, and 23); the degree of conflict in the relationship ("How often do you and your partner argue?"; Items 3, 5, 12, 24 and 25); the extent to which a partner attempts to enrich, improve and maintain their relationship with their spouse (i.e. maintenance/communication: "To what extent do you reveal or disclose very intimate facts about yourself to your partner?"; Items 2, 8, 11, 14 and 22); and ambivalence with respect to the relationship ("How confused are you about your feelings toward your partner?"; Items 6, 9, 15, 18 and 20), that tap the interpersonal character of the relationship. Belsky, Lang and Rovine (1985), demonstrated test-retest reliability over 12 months between .51 to .81 across the four subscales and its sensitivity to marital change across the transition to parenthood supported the RQ's construct validity. In accordance with Belsky, Jaffee, Sligo, Woodward and Silva (2005), scores for two orthogonal factors, positive marital relations versus negative marital relations, were derived from the mean item scores from the love and maintenance subscales versus the conflict and ambivalence subscales respectively.

6.2.3 Measures when infants were 12 months old

6.2.3.1 Infant attachment anxiety and avoidance

Infant attachment was assessed when the infant participants were twelve months old using the Strange Situation conducted in accordance with Ainsworth, Blehar, Waters and Wall (1978). The Strange Situation (SS), is a standardised, laboratory procedure involving an approximately twenty-minute videotaped sequence of eight brief mother-child separation and reunion episodes of increasing stress designed to elicit infant attachment behaviours (Ainsworth, Blehar, Waters & Wall).

The SS assessment of infant attachment has standardised observation scales, scoring protocols and exceptional structural fidelity (Waters & Deane, 1985; Solomon & George, 2008). Greenspan and Lieberman (1999) described the SS as a superb research instrument with cross-cultural validity for the middle class, non-clinical population. Classifications have correspondence with antecedent home observations, exhibit temporal stability in stable middle class families, show meaningful departures from stability associated with environmental instability, and correspond with concurrent and later functioning (Solomon & George, 2008). It has generally high inter-rater reliability, above 80% (Shah, Fonagy & Strathearn, 2010; Solomon & George, 2008).

Infant behaviour in the SS was coded by a reliable coder on 4 dimensions of interactive behaviour during the two reunion episodes in accordance with Ainsworth, Blehah, Waters and Wall (1978). Interactive behaviour includes *proximity seeking, contact maintenance, avoidance* and *resistance*. On the basis of their scores on the interactive reunion behaviour scales, infants are traditionally classified as being either securely (B; 4 subgroups), avoidantly (A; 2 subgroups), or resistant-ambivalently (C; 2 subgroups) attached to their mother. Meta analysis from 2000 Strange Situations has demonstrated a global SS attachment classification distribution of around 65% secure, 21% avoidant and 14% anxious-resistant (van Ijzendoorn & Kroonenberg, 1988).

Ainsworth, Blehar, Waters and Wall (1978), described the discrimination of A, B and C infant attachment classifications using two continuous discriminant functions from the interactive reunion behavior scales. One function discriminated A from B and C, and the second distinguished C from A and B. More recently, Fraley and Spieker's (2003) factor analysis of the reunion scale scores also supported a two-factor solution. The authors conceptualised the two factors as proximity maintenance strategies (proximity seeking versus avoidant strategies), distinguishing A from B and C, and angry resistant strategies, distinguishing C from A and B.

This study will represent infant attachment using two dimensions as per Fraley and Spieker (2003). The two dimensions are conceptualised as representing infant attachment avoidance and anxiety. A principal components analysis of the four interactive behaviour scales across the two reunion episodes will be used to determine which scales relate to infant attachment avoidance versus anxiety. An infant attachment avoidance score will be formed from the sum of the standardised scores of the resulting avoidance reunion scales and an infant attachment anxiety score will be formed similarly by totaling the anxiety reunion scales standardised scores.

6.2.3.2 Parent-other and parent-child stress

Parenting stress will be assessed using the *Parenting Stress Index* (PSI; Abidin, 1995). The PSI is a screening instrument designed to identify parent-child systems under stress and has been shown to predict dysfunctional parenting and problem child behaviors. The PSI is a self-report measure consisting of 120 statements of feelings associated with parenting designed to capture stress experienced by the parent. Responses contribute to either the child or parent parenting stress domains. Stress in the child domain is conceptualised as stress arising from within the parent-child relationship (parent-child stress). Stress in the parent domain is conceptualised as stress arising chiefly from a mother's relationships with people other than her child (parent-other stress), such as a mother's relationship with herself, her spouse or with other members of her community. Participants are asked to rate the extent of their agreement with each statement on a five-point scale, from strongly agree, to agree, to not sure, to disagree, to strongly disagree. Raw scores can be converted to percentile scores by comparison against normative population data. High scores are

above the 85th percentile. PSI percentiles are based on a normative US population of 2633, predominantly white, mothers aged 16 to 61, of children aged 1 to 12 years. Average scores in the normative population were 99.7 (SD=18.8) and 123.1 (SD=24.4) in the child and parent domains respectively.

Participant responses on the PSI form six subscales in the child domain (*distractibility / hyperactivity, adaptability, reinforces parent, demandingness, mood and acceptability*), and seven subscales of stressors in the parent domain resulting from parental and situational characteristics (*competence, isolation, attachment, health, role restriction, depression and spouse*). A total parenting stress score is formed by the sum of the child and parent domain stress scores. The PSI also includes a Life Stress scale consisting of 19 stressful life events experienced in the past 12 months.

The PSI has good content, factorial, concurrent, discriminant and construct validity (Abidin, 1995). Its multicultural validity has been demonstrated. Cronbach alpha reliability coefficients are between .70 and .83 for the child and parent domain scales (*adaptability*, .76, *acceptability*, .79, *demandingness*, .73, *mood*, .70, *distractibility*, .82, *reinforces parent*, .83, *depression*, .84, *attachment*, .75, *role restriction*, .79, *competence*, .83, isolation, .82, *spouse*, .81, *health*, .70), and are .93, .90 and .95 for the parent, child and total stress scores respectively.

In this study subjective parent-child stress will be represented by the PSI child domain, parent-other stress by the PSI parent domain and total parenting stress will be represented by the total stress score. The life events scale of the PSI will form an objective life stress score.

6.2.4 Procedure

Data was collected when the infants were 4, 12 and 24 months old. This chapter will report on some of the data collected. Analyses predicting toddler problem behaviours at 24 months from maternal, child, and relationship factors in chapter seven and from latent

growth trajectories of parenting stress and infant social emotional difficulty in chapter eight, will utilise the remaining data collected.

When the infant participant was 4 months old, mothers were mailed a questionnaire package including background demographic information, the PSI to assess parenting stress, the Center for Epidemiological Studies Depression Scale (CES-D) to assess maternal depression, the Relationship Questionnaire (RQ) to assess marital relations and the SITQ to assess infant temperament. The package also included the Ages and Stages Social Emotional Questionnaire 6 months (ASQ:SE6) to assess infant socioemotional adjustment at 4 months. Mothers also undertook the Adult Attachment Interview (AAI) either in their own home or in an interview room at Ballarat Child and Family Services. Participants were reimbursed $20 as reimbursement for any travel and child care expenses incurred as a result of their participation in this stage of the project.

Mothers were mailed a similar questionnaire package again when their infant participant was 12 months old. The package included the Ages and Stages Social Emotional Questionnaire 12 months (ASQ:SE12) to assess infant socioemotional adjustment at 12 months. The mother-infant pair also participated in the Strange Situation conducted in an interview room at Ballarat Child and Family Services in accordance with Ainsworth, Blehar, Waters and Wall (1978). These were conducted by the student researcher who had attended a University of Minnesota training institute conducted by Alan Sroufe and Betty Carlson. The student investigator trained several female “Strangers” who assisted in conducting the procedures. A sample of several Situations was confirmed by Alan Sroufe as being “codable” in accordance with Ainsworth et al.’s protocol.

Mothers were mailed a similar questionnaire package again when their infant participant was 24 months old. Two additional questionnaires assessed infant socioemotional adjustment at 24 months, the Ages and Stages Social Emotional Questionnaire 24 months (ASQ:SE24) and the Child Behavior Checklist revised $1^1/_2$-3 years (CBCL).

6.2.5 Reliability of maternal and infant attachment measures

6.2.5.1Maternal attachment state of mind scales reliability

AAIs were coded by a trained and reliable coder in accordance with Main, Goldwyn and Hesse (2002). In this study, rates of dismissing, secure and preoccupied interviews were 25%, 54% and 20% respectively. This was consistent with prior meta-analytic reported rates in nonclinical populations of 24% avoidant, 58% secure and 18% anxious (Bakermans-Kranenburg & van Ijzendoorn, 1993).

In order to establish reliability of the AAI rating scales, 30 randomly selected interviews (approximately 25%), were also coded by a second reliable coder who was blind to the aims of the Study. Both coders had attained certified reliability after attending an AAI training institute and completing the reliability testing. Inter-rater classification agreement was 93.5% (Kappa = .90, $p<.01$). This was consistent with reported inter-rater agreement for AAI classifications of above 85% (Hesse, 2008; Sagi et al., 1994; Ziv, 2000).

For each attachment state of mind scale, agreement was judged to be within 1.5 scale points. Percentage agreements ranged between 90.3% and 100.0% (Appendix 4) and thus were substantial to outstanding (Landis & Koch, 1977). Interrater agreement for the involving anger scales has been reported previously as alpha =.74 (Cowan, Cohn, Cowan & Pearson, 1996). There are no inter-rater statistics available for comparison for the other AAI state of mind rating scales.

6.2.5.2Infant attachment behaviour rating scales reliability

SSs were coded by a trained, reliable coder in accordance with Ainsworth, Blehar, Waters and Wall (1978). In this study, rates of avoidant, secure and ambivalent/ anxious infant classifications were 22%, 63% and 15% respectively. This was consistent with previously reported rates in nonclinical populations of 21% avoidant, 65% secure and 14% anxious (van Izjendoorn & Kroonenberg, 1988).

Similarly, in order to establish reliability of the SS reunion behaviour rating scales, 30 randomly selected SSs were also coded by a second reliable coder who was blind to the aims of the Study. Inter-rater classification agreement was 93% (Kappa = .90, p<.01). This was consistent with the generally high inter-rater agreement for SS classifications of between 80 to 88% (Carlson, 1998; Lyons-Ruth, Repacholi, McLeod & Silva, 1991; Solomon & George, 2008). In accordance with widely accepted coding protocol, agreement was defined as rating within one scale point. Percentage agreements ranged between 76.7% and 100.0% (Appendix 4) and thus were substantial to outstanding (Landis & Koch, 1977). There are no inter-rater statistics available for comparison for the interactive reunion behaviour rating scales.

6.2.5.3Maternal and infant attachment concordance

Concordance between maternal and infant attachment classifications was also considered to support coding reliability. The 2-way secure/ insecure concordance was 74.6% and was significantly different from that expected by chance ($\chi^2(1)=28.07$, p<.001). Three way concordance was 66.1% and was also significantly different from that expected by chance ($\chi^2(4)=37.5$, p<.001). An earlier meta-analysis of 854 mother-infant dyads reported a two way secure/ insecure AAI-SSP concordance of 75% and a three way AAI-SSP concordance rate of 70% in low risk populations (kappa = .46; van Ijzendoorn, 1995). Secure, avoidant and anxious concordance rates were 84%, 55% and 30% respectively. This was consistent with previously reported concordance rates of 82%, 64% and 35% respectively (Shah, Fonagy & Strathearn, 2010; van Ijzendoorn, 1995). Thus AAI-SS classification concordance rates in this study were similar to prior research in nonclinical populations and also support the coding reliability in both instruments.

6.2.6 Statistical procedures

SPSS version 11.0 (SPSS Inc., 2001) was used for the descriptive statistics of measures and sample characteristics. A principal components analysis with varimax rotation was used to determine the factor structure of the mother's AAI state of mind scores assessed when their infants were 4 months old. AAI factors were used to form the maternal attachment independent variables. Similarly, the behaviour rating scales from the SS measure of infant

attachment conducted when the infant was 12 months old were also analysed into their principal components using varimax rotation. SS factors were used to form the infant attachment dependent variables.

The path analysis was conducted using Mplus software (Muthen & Muthen, 2006). As path analysis uses observed and not latent variables, fewer parameters are estimated than in structural equation modeling and thus analyses can produce reliable estimates from a smaller sample size. For a path analysis model to be identified the number of estimated parameters must be less than the number of pieces of information available in the covariance matrix, that is p(p+1)/2, where p is the number of constructs measured. The direct and mediated path model to parent-other and parent-child stress (Figure 6.1), includes 10 observed constructs, thus there were 55 variances and covariances available for use in the estimation algorithms. The total number of parameters to be estimated is the sum of the paths, and covariances amongst the variables. From Figure 6.1, the direct and mediational model, there are 29 structural path coefficients and 4 covariances, totaling 33 estimated parameters. Thus the model was overidentified, with more information available than was being estimated. Parameters were estimated using Maximum Likelihood which is robust to nonnormality. Accurate estimation of the hypothesised covariances and paths also requires a ratio of at least 5 participants for each parameter estimated in the model (Chou & Bentler, 1995; Kline, 1998). Thus the sample size was adequate to reliably test the hypothesised model.

The difference between the estimated and observed variance-covariance matrices provided an estimate of model fit. Model fit was assessed using Chi Square (χ^2), comparative fit index (CFI) and root mean square error of approximation (RMSEA) fit statistics in accordance with Hu and Bentler (1998; 1999) and MacCallum, Browne and Sugawara (1996). According to Kenny (2012), χ^2 provides a reasonable measure of fit for samples of 75 to 200 cases. He notes however that χ^2provides poorer fit with larger correlations. Non-significant χ^2, p>.05, indicated good model fit. Good fit was also indicated by a CFI greater than .95. A CFI between .90 and .95 indicated mediocre fit. A CFI of <.90

indicated poor fit. Similarly, a RMSEA < .01 indicated excellent fit. A RMSEA between .08 and .05 indicated good fit. A RMSEA of <.08 indicated mediocre fit.

Missing data was less than 5% for maternal and infant attachment anxiety and avoidance and difficult temperament and less than 10% for positive and negative marital relations and maternal depression. Parent-child and parent-other stress scores were missing for between 10% and 15% of the sample at 4 and 12 months. Some participants omitted some of the 120 PSI questions when completing their questionnaires. In accordance with scoring protocol (Abidin, 1995) this rendered either their parent-other or their parent-child stress score, or both, invalid. Manova revealed mothers who remained in the study had more formal education ($F(1,78)=4.50$, $p<.05$) and higher negative marital relations ($F(1,78)=3.69$, $p=.06$). There were no differences on any of the other background demographic variables nor the study constructs at 4 and 12 months for those participants who remained in the study at 24 months compared with those who did not return their 24 month questionnaires ($F(19,60)=1.10$, $P>.05$). Missing data was assumed to be missing at random (Schafer & Graham, 2002) and was handled using Full Information Maximum Likelihood imputation (Allison, 2001; Muthen and Muthen, 2006).

6.3 Results

6.3.1 Participant characteristics

Participant characteristics at all three stages of the study are given in Appendix 5. When the infants were 4 months old occupation and income data were consistent with a middle class Australian community sample. The distribution of mothers' and fathers' occupations differed from the State of Victoria according to the 2006 Census statistics ($\chi^2(6)=66.05$, $p<.05$ and $\chi^2(10)=37.83$ respectively, $p<.05$; ABS, 2006). There were higher proportions of professional men and women in the sample compared with the state of Victoria. Median family weekly income (between $1,153.85 and $1,346.14) was above the Australian average ($1010.30, ABS, 2011).

Approximately two thirds of mothers were university educated with a tertiary qualification. Approximately two thirds of the infants were from single child families, one quarter had one older sibling, with the remaining infants having two or more older siblings. First time mothers were younger and had shorter relationships with their child's father than multiprimous mothers ($\chi^2(2)=10.16$, $p<.01$ and $\chi^2(2)=14.15$, $p<.01$ respectively). A greater proportion of the infants of first-time mothers were boys than for multiprimous mothers (61.8% versus 40.4%, $\chi^2(1)=5.40$, $p<.05$). There were no other differences on background variables between first-time and multiprimous mothers. Thus they were considered to represent a single population of mother-infant dyads.

There were more first time mothers recruited from the Ballarat Child and Family Services Day Stay Program than those recruited via the Maternal and child health centres and the hospital post-natal wards (80.0% versus 46.0% and 56.2% respectively; $\chi^2(2)=7.90$, $p<.05$). Similarly there were relatively more Day Stay mothers with relationships with the child's father being less than five years old (82.6% versus 67.8% and 54.2% respectively; $\chi^2(4)=9.39$, $p<.05$). There were no other differences between recruitment groups on background variables. Thus they were considered to reflect a single underlying population.

The distributions of mothers in paid employment when their infants were 4 and 12 months old were significantly different ($\chi^2(4)=170.51$, $p<.001$). This reflected the return to paid employment by most mothers within their child's first year. Around four fifths of the mothers were not in paid employment when their infant was 4 months old. By their infants' first birthday almost half of the mothers were in paid employment more than 20 hours per week. Family income and mother-baby separation increased from 4 to 12 months as more mothers returned to the workforce by the end of their baby's first year.

Six participants participated in the SS at 12 months but did not return their questionnaires; hence they were omitted from data analyses for this chapter reducing the sample size from 123 to 117. A Manova revealed these six participants had significantly higher maternal reported depression and maternal attachment anxiety than remaining

participants when their infants were 4 months old but did not differ on any of the background demographic variables nor the other 4 month measures.

When the infants were 24 months old the sample size was reduced to 47 mother-infant pairs. Differences between 24 month study participants and those who withdrew from the study were investigated. Chi square analyses were conducted to compare background characteristics assessed at 4 months of the participants at 24 months with those who participated in the original 4 month and subsequent 12 month stages of the study (Appendix 5). As stated previously, there were no differences in the distributions of maternal age, and employment, parental relationship length, family income level, number of hours per week of mother-infant separation, child gender, or number of older siblings. Mothers who participated at 24 months had more formal education than those who did not return their questionnaires. A Manova revealed no differences on study constructs assessed at 4 and 12 months between study participants and non-participants at 24 months as stated previously.

When the study infant participants were 24 months old, 4 mothers had had another baby and 9 mothers were pregnant. Family income, maternal employment and mother-baby separation increased from 12 to 24 months as more mothers returned to the workforce after the birth of their baby. Thus, the 24 month sample remained predominantly a middle class, educated, Australian sample.

6.3.2 Model constructs when infants were 4 months old

6.3.2.1Maternal attachment avoidance and anxiety

Means, standard deviations and correlations between scores for Attachment SOM scales are shown in Appendix 6. Means scores on all scales were less than 2.5. *Idealisation of mother* and *Idealisation of father* were significantly associated with each other. Similarly *Involving anger with mother* was positively associated with *Involving anger with father*. The dismissing *Idealisation* and *Lack of memory* scales were negatively associated with the preoccupied scales including *passivity of discourse* and *involving anger* with either parent. *Derogation* towards either parent was not associated with any of the other SOM scales.

Passivity of discourse was associated with *Involving anger with father* and to a lesser extent with *Involving anger with mother*.

A principal components analysis (pca) with varimax rotation was conducted on the AAI State of Mind (SOM) scores to determine the dimensional structure of the maternal attachment construct. Varimax rotation was selected as appropriate for orthogonal dimensions. The pca produced a two factor and a four factor solution. Extracted factors had eigenvalues greater than one. Both solutions explained around 70%, of the variance in AAI SOM scale scores (Appendix 7). In the two factor solution, one factor consisted of positive loadings on the *Preoccupied* scales, I*nvolving anger with mother* and *father* and *Passivity of discourse.* The *Dismissing scales, of Idealisation of mother* and *father and Lack of memory* also loaded negatively on the first factor*.* The first factor distinguished dismissing, avoidant strategies from preoccupied, anxious, strategies with oppositely valenced loadings. The other factor consisted of the *Derogation of mother* and *father* scales*.* Derogation in the AAI occurs rarely and is usually at relatively low levels, particularly in low risk populations. Thus there was relatively little variance available for extraction from the derogation SOM scales. Standard deviations for the derogation scales were significantly lower than for other AAI SOM scales (<.5 versus >1.5 respectively, Appendix 7). From the two factor solution it was concluded derogation was functionally different from the other AAI SOM strategies, possibily due to its low occurrence, and idealisation and lack of memory were functionally different from preoccupied strategies of involving anger and passivity of discourse.

In the four factor solution, the first component included high positive loadings on the *Dismissing* scales of *Idealisation of mother* and *father* and a moderate negative loading on the *Preoccupied Passivity* scale. Thus it represented strategies of Attachment Avoidance. The second factor consisted of the *Preoccupying Involving anger* scales and represented strategies of Attachment Anxiety. The *Dismissing Lack of memory* scale and negative *Passivity* loaded on the third factor. *Derogation towards mother* and *father* loaded onto the fourth factor. Thus three of the four factors represented idealisation, lack of memory and derogation as different forms of attachment avoidance. Passivity of discourse was inversely related to idealisation and lack of memory but was unrelated to derogation. The fourth factor represented involving anger as a form of maternal attachment anxiety.

Thus, although the results of the pca did not clearly delineate anxiety versus avoidance factors, together the two solutions point to possible functional differences amongst the AAI SOM scales either by having an oppositie valence or loading on separate factors. Dismissing SOM scales were demonstrated to be functionally different from the Preoccupied scales. Thus it was decided to form a maternal attachment avoidance score from the Dismissing scales. Maternal passivity and involving anger were shown to be functionally different from the avoidance scales. Thus it was decided to form a maternal attachment anxiety score from the Preoccupied scales. This approach was consistent with findings from an earlier pca on a larger sample (Roisman, Fraley & Belsky, 2007). In the current study, a Maternal Attachment Avoidance score was constructed from the sum of the standardised scores on the five Dismissing scales including *Lack of memory*, *Idealisation* and *Derogation of mother* and *father*. A Maternal Attachment Anxiety score was constructed from the sum of the standardised scores on the three *Preoccupied* scales of *Passivity* and *Involving anger with mother* and *father*. However given the mixed results of the pca, analyses were also run to investigate effects of individual maternal attachment states of mind.

6.3.2.2Difficult temperament

Difficult temperament scale means, standard deviations and correlations are presented in Appendix 6. The SITQ scale used to assess difficult temperament had acceptable internal consistency (α=.77). The average difficult temperament rating by mothers of their 4 month old infants was 2.49 ($\overline{SD}$=.66). Temperamentally *Difficult* infants were identified as those infants with difficult temperament scores 1 standard deviation above the mean. *Easy* infants were those with difficult temperament scores 1 standard deviation below the mean (Sanson, Prior, Garino, Oberklaid & Sewell, 1987). In this study difficult temperament corresponded to scores above 3.15. There were 21 *Difficult* infants, or 18% of the sample, with difficult temperament scores greater than 1 standard deviation above the mean. *Easy* infants in this study had difficult temperament scores less than 1.83. There were twenty *Easy* infants, or 17% of the sample, with difficult temperament scores less than 1.83.

6.3.2.2Maternal depression

The CES-D scale used to assess maternal depression had excellent internal consistency (α=.92). Twenty-one per cent of mothers had depression scores greater than or equal to 16 at 4 months. This was consistent with Radloff's (1977) non clinical sample where 21% of the participants were above the potential referral score of 16.

6.3.2.3Marital relations

The Relationship Questionnaire items used to assess positive and negative marital relations had good internal consistency (α=.82 and α=.87 respectively). On average negative marital relations was substantially lower than positive marital relations, characteristic of the low risk nature of the sample. The positive and negative relations scores reported by low risk mothers in this study are comparable with those reported by Belsky, Jaffee, Sligo, Woodward and Silva (2005) in their low risk sample ($\overline{X}$=7.05 and $\overline{X}$=3.23 respectively).

6.3.3 Model constructs when infants were 12 months old

6.3.3.1Infant attachment anxiety and avoidance at 12 months

Means, standard deviations and correlations for the reunion episodes infant interactive behaviour rating scales are shown in Appendix 6. Scores ranged between 1 and 7, where 1 is the minimum and 7 is the maximum scores that could be assigned. On average, proximity seeking, contact maintenance and resistance increased from the first to the second reunions. On average, avoidance decreased slightly from the first to the second reunions. Most infants, 58%, displayed no resistance towards their mother in the first or second reunions. Over a third, 39%, displayed no attachment avoidance towards their mother in the first or second reunions. There were eight infants, 6.5%, with both elevated attachment second reunion resistance and avoidance scores. Proximity seeking and contact maintenance were highly associated with each other and negatively with avoidance. Contact maintenance but not proximity seeking was also associated with resistance. There was no apparent relation between the avoidance and resistance scale scores.

As for maternal attachment, a pca with varimax rotation was conducted using the Strange Situation first and second reunion interactive behaviour ratings to determine their dimensional structure. Two factors explained 70% of the variance in Strange Situation

interactive behaviour scores (Appendix 7). Factor 1 represented infants who were high on *Avoidance* and/or low on *Proximity seeking* and *Contact maintenance* in both reunion episodes of the SS. It represented a component of approach versus avoidance strategies and thus was interpreted as an Infant Attachment Avoidance factor. Resistant behaviour in both reunion episodes loaded onto the second factor and thus this was conceptualised as an Infant Attachment Anxiety factor. An Infant Attachment Avoidance score was formed from the sum of the standardised second reunion *Avoidance* and negative second reunion *Proximity seeking* and *Contact maintenance* scores. Although first reunion *Avoidance* also had a high loading on the first factor, this scale was omitted from the Infant Attachment Avoidance construct. Infants with high first reunion *Avoidance* almost always also have high second reunion avoidance. Infants with low to moderate first reunion *Avoidance* may either have low or high second reunion *Avoidance*. Thus it is second reunion avoidant behavior when stress levels are highest that is the most informative with respect to Infant Attachment Avoidance. Infant attachment anxiety was represented by the scales with the highest loadings on the second factor, namely, the first and second reunion *Resistance* scales.

6.3.3.2Parent-other and parent-child stress

There was good internal consistency for the parent-other and parent-child stress scales (α=.88 and α=.85 respectively). Parenting stress levels reported by mothers of 12 month infants were generally low. Average maternal parent-other stress was around the 40th percentile and average parent-child stress was around the 25th percentile. Less than 10% of mothers had parenting stress levels in either domain above the 85th percentile. Parent-child relationship stress was related to parent-other stress.

6.3.4 Associations amongst model constructs

Study constructs were largely unaffected by levels of background characteristics including family size, income, maternal age, employment, and education, mother-infant separation, and infant gender (Appendix 8). Positive marital relations at 4 months decreased with increased maternal age. Maternal attachment avoidance increased with increased maternal education. Parent-other stress at 12 months, maternal attachment anxiety and

infant attachment avoidance increased with increased family size. Difficult temperament at 4 and 24 months increased with increased parental relationship length. Mother-baby separation at 4 months was associated with increased infant attachment anxiety at 12 months and decreased positive marital relations and father reported externalising problem behaviours at 24 months. Mothers of two year old girls reported higher parent-child stress than mothers of two year old boys. Maternal employment at 4 months was associated with decreased positive marital relations at 12 and 24 months and increased maternal depression at 24 months. There were no other associations between background characteristics and study variables across infancy.

Correlations amongst model constructs are given in Table 6.1. Parent-other and parent-child stress were strongly positively associated at twelve months ($r=.76$, $P<.01$). Patterns of association between constructs at 4 months with parent-other versus parent-child stress at 12 months were similar, although some constructs, negative marital relations and maternal attachment anxiety and avoidance, had stronger relations with parent-other than parent-child stress. Parent-other and parent-child stress at 12 months were positively associated with negative marital relations, maternal depression and infant difficult temperament assessed when the infants were 4 months old. Maternal attachment anxiety and avoidance were positively and negatively associated with both parent-other and parent-child stress respectively. Early positive marital relations was not associated with subsequent parent-other or parent-child stress. Infant attachment avoidance was negatively associated with both concurrent parent-other and parent-child stress although the relations just failed to reach significance. There were no relations between concurrent parent-other nor parent-child stress and infant attachment anxiety.

There were interrelations amongst maternal and infant attachment, marital relations and maternal depression. Maternal attachment avoidance was negatively associated with maternal attachment anxiety, difficult temperament and negative marital relations at 4 months, and positively with infant attachment avoidance at 12 months. Maternal attachment anxiety was positively associated with negative marital relations and maternal depression at 4 months and infant attachment anxiety at 12 months. Positive marital relations were negatively associated with negative marital relations but were not related to

any of the other model constructs. Negative marital relations were positively associated with maternal depression and infant difficult temperament. Infant difficult temperament was significantly associated with maternal depression.

6.3.5 Preliminary analyses predicting parent-other and parent-child stress at 12 months

Separate preliminary path analyses were run to test the direct and mediated effects of maternal attachment and avoidance with positive and negative marital relations, difficult temperament and maternal depression at 4 months and concurrent infant attachment anxiety and avoidance on parent-other and parent-child stress at 12 months. There were significant paths to parent-other stress from maternal attachment anxiety, negative marital relations, difficult temperament and maternal depression. In contrast, the direct paths from maternal attachment anxiety and negative marital relations to parent-child stress did not reach significance. The negative paths from infant attachment avoidance to parent-other and parent-child stress approached significance. There were no relations between positive marital relations or maternal attachment avoidance and parent-other or parent-child stress. Paths from maternal attachment anxiety to positive or negative marital relations and difficult temperament were not significant. The path from maternal attachment avoidance to negative but not positive marital relations was significant. The path from maternal attachment avoidance to difficult temperament approached significance. Neither path from maternal attachment anxiety nor avoidance to maternal depression was significant.

Maternal attachment SOM analyses demonstrated the relation between maternal and infant attachment avoidance was due to both *Idealisation* and *Derogation of mother* in the AAI conducted when the infant was 4 months old. The inverted relation between maternal attachment avoidance and infant attachment anxiety was due to the *Idealisation of mother* and negative *Derogation of father* AAI SOM scales. The path from *Lack of memory* to infant attachment anxiety also approached significance. *Idealisation of father* and *Derogation of mother* were unrelated to infant attachment anxiety. All three of the maternal attachment anxiety scales were related to infant attachment anxiety. However, neither *Passivity* of discourse nor *Involving anger with mother or father* at 4 months, were related to infant attachment avoidance at 12 months.

6.3.6 Integrated path model predicting parent-other and parent-child stress in mothers of 12 month old infants from maternal attachment and depression, marital relations and infant difficult temperament when infants were 4 months old and concurrent infant attachment anxiety and avoidance

Relative effects were compared in a final integrated path analysis which incorporated relevant paths indicated by the separate preliminary analyses described above. Thus hypothesised mediating paths from maternal attachment anxiety via negative marital relations and difficult temperament were not included in the integrated model. Partial mediation of maternal attachment anxiety by maternal depression and infant attachment anxiety and avoidance paths however were included. Similarly, positive marital relations was excluded in the integrated model due to non significant paths to both parent-other and parent-child stress. Paths from maternal attachment avoidance to negative marital relations, maternal depression and infant difficult temperament were included in light of the significant or near significant paths obtained above. The importance of maternal depression in predicting both parent-other and parent-child stress was demonstrated in the preliminary analyses. Thus mediated paths to parent-other and parent-child stress were investigated from difficult temperament and negative marital relations via maternal depression.

The integrated model had acceptable fit ($\chi^2(16)= 21.65$, $p>.05$, CFI=.976, RMSEA=.06, p<.05=.38) and explained 51.9% of the variance in parent-other stress and 47.6% of the variance in parent-child stress. There were significant paths from maternal attachment anxiety, maternal depression and negative infant attachment avoidance to parent-other stress and parent-child stress at 12 months (Figure 6.2; β=.22, p<.05, β=.50 and β=-.25 respectively, p<.01 for parent-other stress and β=.15, p<.05, β=.42 and β=-.24 respectively, p<.01 for parent-child stress). Whereas the path from difficult temperament to parent-other stress approached significance (β=.12, p=.10), it was highly significant for parent-child stress (β=.34, p<.01). The direct paths from negative marital relations and maternal attachment avoidance to either parent-other or parent-child stress were not significant (β= .10 and β=-.06 respectively for parent-other stress, and β=-.05 and β=.04 respectively for parent-child stress, p>.05).

Maternal attachment avoidance was associated with maternal depression and negatively with negative marital relations (β=.18, p<.05 and β=-.19 respectively, p<.06). The path between maternal attachment anxiety and maternal depression just failed to reach significance (β=.16, p=.08). Similarly, the path between maternal attachment avoidance and difficult temperament also failed to reach significance (β=-.13, p>.05). Paths from difficult temperament to both negative marital relations and maternal depression were significant (β=.20 and β=.40 respectively, p<.01). The path from negative marital relations to maternal depression was also significant (β=.26, p<.01). Thus the paths from negative marital relations and difficult temperament to maternal depression were significant, whilst their direct paths to parent-other stress when maternal depression was included in the model, were not. Hence, maternal depression mediated the effects of negative marital relations and difficult temperament on parent-other stress.

Analysis supported the protypical and compensatory paths from maternal attachment anxiety to both infant attachment anxiety and avoidance (β=.22, p<.05 and β=.16, p=.06 respectively). The path from maternal attachment avoidance to infant attachment avoidance also supported the prototype theory (β=.22, p<.05). There was no support for a compensatory mechanism between maternal attachment avoidance and infant attachment anxiety.

Results of the integrated analysis demonstrated maternal depression accounted for most of the variance explained by the path model in parent-other and parent-child stress. Difficult temperament was also important in predicting the variance in parent-child stress. Maternal depression mediated the effects of negative marital relations on parent-other and parent-child stress. Maternal depression also mediated the effect of difficult temperament on parent-other stress. Both the direct and mediated paths via maternal depression from difficult temperament to parent-child stress were significant. There were also significant direct paths from maternal attachment anxiety and negative infant attachment avoidance to both parent-child and parent-other stress at 12 months.

6.4 Discussion

6.4.1 Sample characteristics

The study's low risk Australian community sample comprised 123 mothers and their infants. Two mothers were single, the rest were in two parent father-mother families. The study infant was the mother's first child for the majority of participants. Maternal attachment, parenting stress and difficult temperament were assessed at 4 months. Infant attachment and parenting stress was assessed at 12 months. There were some associations between study variables and background characteristics of family structure, income, maternal age, employment and education.

Around one fifth of the 4 month old infants were rated by their mothers as being difficult and a similar proportion, as temperamentally easy. Difficult temperament ratings were similar those reported by Sanson, Prior, Garino, Oberklaid and Sewell (1987) in another low risk Australian sample.

Similarly, around one fifth of the sample had elevated maternal depression scores at 4 months. This was higher than reported depression rates of around 10% in low risk populations (Lindeman et al, 2000). However the depression measure used in this study, the CES-D, is a screening instrument for those at risk of depression and not a diagnostic tool. Elevated scores on the CES-D suggest referral for further assessment for depression. Hence it is likely that not all of those identified as at risk would have received a clinical depression diagnosis. The proportion of mothers with elevated CES-D scores was in accordance with prior research in a low risk population (Radloff, 1977). Average negative and positive marital relations ratings in this study were also consistent with prior research conducted in a low risk population of 146 mothers ($\overline{X}$=3.3 versus $\overline{X}$=3.2 and $\overline{X}$=7.1 versus $\overline{X}$=7.1 respectively; Belsky, Jaffee, Sligo, Woodward & Silva, 2005).

Table 6.1

Means, standard deviations and correlations amongst maternal attachment anxiety and avoidance, difficult temperament, positive and negative marital relations and maternal depression when infants were 4 months old, and infant attachment anxiety and avoidance and parenting stress when infants were 12 months old

			4 months								12 months			
			Maternal Attach		Marital Relations		Mat Depn	Dif temp	Parenting stress		Infant attach		Parenting stress	
4 month Measures	**Mean**	***(SD)***	**Mav**	**Max**	**Pos**	**Neg**			**Par**	**Child**	**Iav**	**Iax**	**Par**	**Child**
Maternal attachment avoidance	-	-		-.44**	.09	-.27**	-.07	-.17	-.21*	-.11	.23*	-.08	-.24*	-.12
Maternal attachment anxiety	-	-			.01	.20*	.26**	.02	-.25**	.13	.02	.24**	.30**	.16
Marital relations-positive	7.10	*(1.11)*				-.28**	-.15	-.09	-.22*	-.11	.10	.02	-.07	-.03
Marital relations-negative	3.25	*(1.37)*					.39**	.21*	.51**	.13	.01	.01	.34**	.19
Maternal depression	9.92	*(9.28)*						.40**	.78**	.52**	.13	.00	.59**	.54**
Child difficult temperament	2.49	*(.66)*							.48**	.52**	-.08	.11	.37**	.53**
Parent-other stress	120.63	*(28.51)*								.58**	.02	-.13	.83**	.62**
Parent-child stress	93.77	*(19.57)*									.03	-.03	.57**	.72**
12 month measures														
Infant attachment avoidance	-	-										-.19*	-.17	-.18
Infant attachment anxiety	-	-											.04	.00
Parent-other stress	114.48	*(28.36)*												.76**
Parent-child stress	88.72	*(18.21)*												

**** p<.05, **p<.01***

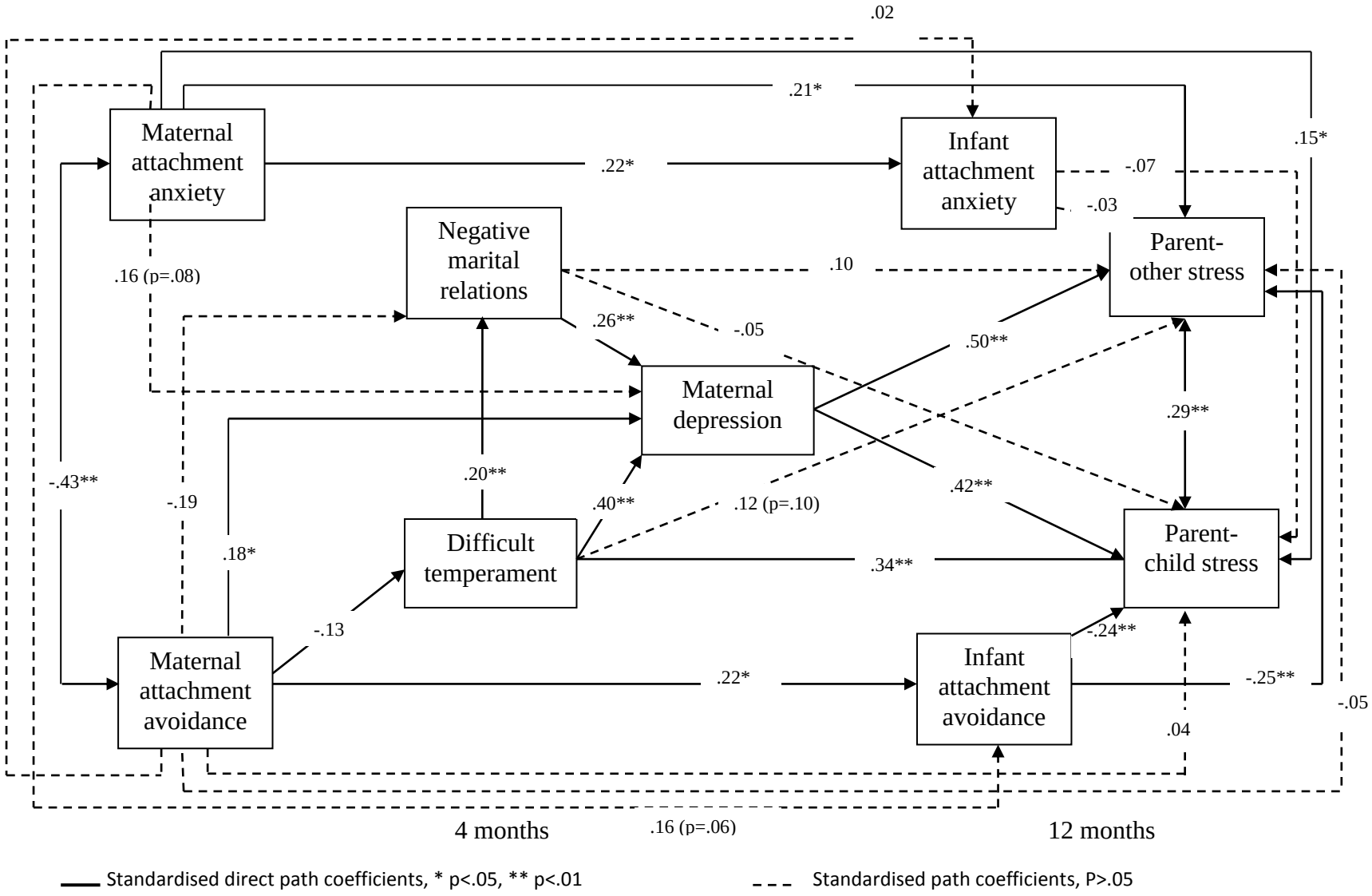

Figure 6.2 Integrated path model predicting mothers' parent-other and parent-child stress when their infants were 12 months old from maternal attachment anxiety and avoidance, difficult temperament, negative marital relations and maternal depression when their infants were 4 months old and concurrent infant attachment avoidance

There is a paucity of research that has investigated attachment relations beyond the traditional attachment classifications. This study was the first to consider relations using dimensions of maternal and infant attachment anxiety and avoidance. Reliability coding of 30 randomly selected AAIs demonstrated high inter-rater agreement, greater than 90%. Prior research has reported classification reliability of 76% (kappa = .68; Cowan & Cowan, 2009). Agreement within one and a half scale points on the AAI SOM scales ranged between 90% and 100%. There are no comparable inter-rater agreement statistics available for these.

Maternal attachment was assessed using the AAI SOM scales. Principal components analysis of the AAI SOM scales in this study did not replicate an earlier two factor structure (Roisman, Fraley & Belsky, 2007). This was possibly explained by the use of different derogation scales and variation in sample composition. A maternal attachment anxiety measure was formed from the sum of the standardised scores on the preoccupied scales of *Passivity* and *Involving anger with mother* and *father*. Similarly, a maternal attachment avoidance measure was formed from the sum of the standardised scores on the dismissing scales of *Idealisation*, *Derogation* and *Lack of memory*. The maternal attachment anxiety and avoidance measures were negatively associated. The four factor pca suggested there may be functional differences amongst the avoidant strategies of idealisation, lack of memory and derogation and between the two preoccupied strategies of passivity versus involving anger. This was investigated further in chapter seven.

Infant attachment was assessed using the SS reunion behavior scales. Principal components analysis of the SS interactive reunion behavior scales in this study replicated the two factor structure of infant attachment reported by Fraley and Spieker (2003). The first factor consisted of infant *Avoidance* and negative *Proximity seeking* and *Contact maintenance* and was interpreted as representing infant attachment avoidance. An infant attachment avoidance measure was formed from the sum of the standardised second reunion *Avoidance* and negative second reunion *Proximity seeking* and *Contact maintenance* scores. The second factor consisted of the first and second reunion *Resistance* scores and was interpreted as representing

infant attachment anxiety. An infant attachment anxiety measure was formed from the sum of the standardised first and second reunion *Resistance* scores. The infant attachment avoidance and anxiety measures were negatively associated.

Maternal attachment avoidance at 4 months was associated with infant attachment avoidance at 12 months. Maternal attachment anxiety at 4 months was associated with infant attachment anxiety at 12 months. Effect sizes for both concordant attachment relationships were small ($r<.25$). Discordant or compensatory attachment relationships were not significant.

6.4.2 Parenting stress in mothers of 12 month old infants

Parenting stress was comparable to previous reporting in a low risk sample of parents of infants for parent-child ($\overline{X}$=88.72 versus $\overline{X}$=99.03) and parent-other stress ($\overline{X}$=114.48 versus $\overline{X}$=119.55; Jarvis & Creasey, 1991). The distribution of mothers' difficult temperament ratings of their 4 month old infants was comparable to a large Australian normative sample of infants aged 4-8 months ($\overline{X}$=2.49 versus $\overline{X}$=2.50 and $\overline{SD}$=.66 versus $\overline{SD}$=.64; Sanson, Prior, Garino, Oberklaid & Sewell, 1987).

6.4.3 Associations amongst parenting stress, maternal, infant and relationship constructs when infants were 4 and 12 months old

Consistent with prior research, difficult temperament at 4 months was highly correlated with parent-other and parent-child stress 12 months (Abidin, 1992; Chang & Fine, 2007; Deater-Deckard, 2004; Gelfand, Teti & Fox, 1992; Owens & Shaw, 2003; Muslow, Caldera, Pursley, Reifman & Huston, 2002). Similarly, maternal depression was also highly correlated with parent-other and parent-child stress at 12 months, in accordance with prior research (Deater-Deckard; Gelfand, Teti & Fox; Williford, Calkins & Keane, 2007).

As expected maternal attachment anxiety was positively associated with mothers' parent-other stress. This was consistent with the notion discussed in chapter three that dysregulated mothers are likely to have less effective coping skills, a restricted focus on distress and negative experiences and thus experience higher

parenting stress (Billings & Moos, 1982; Carlson, Sampson & Sroufe, 2003; Cassidy, 1994; Main, 2000; Mikulincer & Shaver, 2008; Weinfeld, Sroufe, Egeland & Carlson, 2008). Anxious mothers were expected to be more likely to both be aware of their experience of stress and to report it than avoidant mothers. However the relationship between maternal attachment anxiety and parent-child stress was weaker than with parent-other stress and did not reach significance.

Thus this study has demonstrated maternal attachment anxiety has more effect on stress arising from a mother's relationship with others than with her own infant. Elevated parenting stress in mothers who were classified as being insecure-anxious on the AAI has been reported in the literature (Mikulincer & Shaver, 2008). The importance of this study lies in the demonstration of an association between the dimension of maternal attachment anxiety across secure and insecure mothers and parenting stress in a low risk population. Hence, even low, secure levels of attachment anxiety were shown to affect parenting stress. This conclusion could not have been drawn from traditional classification-based attachment research.

Maternal attachment avoidance was negatively associated with parent-other stress across infancy. The relationship between maternal attachment avoidance and parent-child stress at 12 months was negative but did not reach significance. Thus this study revealed both maternal attachment anxiety and avoidance were more related with maternal reported stress arising from a mother's relationship with herself and others than from her relationship with her infant. This conclusion could not have been drawn had total parenting stress not been parsed into the parent and child domains.

Findings were consistent with the proposition discussed in chapter three that avoidance involved the restriction of attention away from negative experiences that may imply stressor vulnerability (Cassidy, 1994; Kobak & Seery, 1988; Main, 2000; Mikulincer & Shaver, 2008; Power, 2004). Findings were contrary however to McKelvey, Fitzgerald, Schiffman and Von Eye's (2002) expectation that elevated attachment avoidance would be associated with increased parenting stress. This

study utilised a self report measure of parenting stress. Whilst avoidant mothers would not be expected to be aware of or necessarily report their feelings of stress, it was possible they experienced elevated stress nonetheless. Alternate stress measures such as skin conductance and cortisol levels would help clarify whether there was concordance between self reported subjective and biological stress in mothers with elevated attachment avoidance.

Infant attachment anxiety and avoidance were used to assess the effect of the mother-infant relationship on parent-other and parent-child stress. Contrary to prior findings, infant attachment anxiety was not associated with parent-other nor parent-child stress at 12 months (Abidin, 1995; Atkinson et al., 2000). Perhaps the association only exists at high, insecure levels of infant attachment anxiety. Infant attachment avoidance was negatively associated with both parent-other and parent-child stress at 12 months, although both just failed to reach significance ($r = -.17$, $p = .07$ and $-.18$, $p = .06$ respectively).

Negative marital relations at 4 months in this study were positively associated with parent-other and parent-child stress at 12 months consistent with prior research (Abidin, 1976; Cummings & Davies, 1994; Deater-Deckard, 2004). This was contrary to Feeney, Alexander, Noller and Hohaus' (2003) proposal that the association would only be evident at elevated stress levels. Negative marital relations were more closely related to parent-other than parent-child stress. Although some effect of negative marital relations on the parent-child relationship and thus on parent-child stress can be expected, it makes sense that there would be a closer relation with the parent-other stress construct. It is also likely that some of the association between parent-other stress and negative marital relations represents construct overlap between the PSI's parent domain Spouse scale and the Relationship Questionnaire's negative marital relations items. Thus this study has provided some support for differential effects of negative marital relations on parent-other versus parent-child stress in accordance with Grant and colleagues (Grant et al., 2003; McMahon, Grant, Compas, Thurm & Ey, 2003).

Contrary to expectation, but consistent with Feeney, Alexander, Noller and Hohaus (2003), there was no relation between positive marital relations and either parent-other or parent-child stress at 12 months. Despite the non-significant relations, both positive and negative marital relations were more strongly associated with parent-other than parent-child stress.

Consistent with prior research, interrelations were observed amongst maternal attachment, negative marital relations and maternal depression as well as with difficult temperament (Crowell, Treboux & Waters, 2002; Feeney, Alexander, Noller & Hohaus, 2003; Noftle & Shaver, 2006). Maternal attachment avoidance was associated negatively with negative marital relations and infant difficult temperament as expected. This was consistent with the notion that avoidant mothers are less likely to perceive and/or report difficulties. However, maternal attachment avoidance was unrelated to maternal depression. As expected, maternal attachment anxiety was positively associated with negative marital relations and maternal depression. This was consistent with the expectation that anxious mothers are more likely to perceive/ and or report negative experiences.

Maternal depression was associated with difficult temperament and negative marital relations. Positive marital relations were largely unrelated to the other constructs, although there was a negative relation with depression that failed to reach significance ($r=-.15$, $p=.10$). With the exception of the maternal and infant attachment anxiety and avoidance measures, the remaining constructs were measured by maternal self report. Some inflation of associations involving self report constructs can be expected due to shared method variance. The AAI purportedly taps unconscious attachment strategies. Thus, as per Roisman et al. (2007), lower associations were found between the subconscious maternal attachment anxiety and avoidance constructs and the conscious self-report constructs.

6.4.4 Direct and indirect paths to mothers' parenting stress when their infants were 12 months old from maternal, infant and relationship constructs when infants were 4 and 12 months old

The lack of a theoretical model of the development of parenting stress was highlighted in chapter three (Östburg & Hagekull, 2000). This was addressed in this chapter by conducting an empirical investigation of the development of parenting stress in mothers of 12 month old infants in a community sample. A lack of consideration of potential variation of effects on different aspects of parenting stress was identified as another gap in the parenting stress literature in chapter three (Coyle, Roggman & Newland, 2002; Grant et al., 2003). In the current study, parenting stress was parsed into stress arising from a mothers' relations with her infant, labelled as parent-child stress, versus stress arising from her relations with others, or parent-other stress. Finally, this study also addressed the lack of consideration of differential pathways to and from different insecure attachment strategies of anxiety and avoidance highlighted in chapter four.

Thus, this chapter utilised a reconceptualisation of Belsky's "Determinants of parenting" model (1984) (Figure 6.1). The model was used to investigate pathways to maternal parent-other versus parent-child stress at 12 months in a longitudinal design from maternal childhood experiences (maternal attachment anxiety and avoidance), genetic predisposition (maternal depression), and current interpersonal relations (infant attachment anxiety and avoidance), in accordance with Rothbart, Ahadi and Evans (2000).

In chapter three discussion reconceptualised Belsky's model as a parenting stress model. Consistent with the prototype hypothesis, a mother's current state of mind with respect to her childhood relationship with her own parents purportedly affected her current relationships including with herself, her spouse, and with her infant. A mother's relationships with herself and others were in turn proposed to affect her level of parenting stress. Whereas negative marital relations were expected to contribute to parenting stress, positive marital relations were hypothesised to reduce parenting stress. However it was also anticipated that

buffering effects may not be significant in a low risk population. Buffering effects of positive marital relations on parenting stress was tested in this study. Maternal depression and negative marital relations at 4 months were hypothesised to mediate the relations between maternal attachment and parenting stress at 12 months. Discussion in chapter four theorised some infants may adopt compensatory attachment strategies that were opposite to their mothers'. Thus it was proposed infant attachment may mediate the effects of maternal attachment on parenting stress either by protypical or compensatory pathways.

It had been hypothesised that different pathways may be involved with different aspects of parenting stress (Grant et al., 2003; McMahon, Grant, Compas, Thurm & Ey, 2003). Thus this study investigated pathways to parent-other and parent-child stress separately. Parent-child stress was conceptualised as representing a mother's stress arising from her relationship with her infant and was measured by the Child domain of the PSI (Abidin, 1995). Parent-other stress was conceptualised as representing stress arising from a mother's relationship with herself and others outside the parent-child relationship including her spouse and wider social network and was measured by the Parent domain of the PSI. Both maternal and infant attachment anxiety and avoidance were expected to contribute to parent-other and parent-child stress. Direct effects on parent-other and parent-child stress were also expected from maternal depression and difficult temperament. It was expected that marital relations would be relatively more influential in determining parent-other stress and difficult temperament relatively more influential in determining parent-child stress. Indirect effects of maternal attachment and infant difficult temperament were also expected via their effects on negative marital relations, maternal depression and infant attachment anxiety and avoidance. Maternal depression and negative marital relations at 4 months were expected to be associated with increased parenting stress at 12 months.

An integrated path model informed by the preliminary analyses investigated simultaneous effects of maternal, child and relationship constructs on mothers' parenting stress. Positive marital relations was omitted from the model due to its

lack of associations in the preliminary analyses. Consistent with expectation there were direct paths from maternal depression and maternal attachment anxiety at 4 months and negative infant attachment avoidance at 12 months to both parent-other and parent-child stress at 12 months. Hence maternal depression, maternal attachment anxiety and negative infant attachment avoidance were generic predictors of mothers' parenting stress when their infants were 12 months old independent of the source of stress. Difficult temperament predicted parent-child but not parent-other stress, although the latter approached significance (p=.10). Maternal attachment anxiety was relatively more important in the prediction of parent-other stress whereas difficult temperament was relatively more important in the prediction of parent-child stress.

Neither of the direct paths from negative marital relations to parent-other nor parent-child stress were significant in the integrated model. The reduced role of negative marital relations in predicting parenting stress relative to other constructs included in the model was contrary to some prior research (Crnic & Low, 2002; Deater-Deckard, 2004). However it was consistent with Deater-Deckard's (2004) notion raised in chapter three that a mother's parenting stress may be less affected by negative marital relations. Similarly, this study found no evidence for a direct beneficial effect of early positive marital relations reducing either parent-other or parent-child stress at 12 months.

Maternal attachment anxiety was related to maternal depression and infant attachment anxiety and avoidance but not to negative marital relations or difficult temperament. Whereas the direct paths from maternal attachment anxiety to parent-other and parent-child stress were significant, the indirect effects via maternal depression and infant attachment anxiety were not. Thus maternal attachment anxiety had a unique, direct effect on parent-other and parent child stress. There was no support for mediation of the effects of maternal attachment anxiety on parent-other or parent-child stress by difficult temperament, negative marital relations or maternal depression. The assertion that maternal attachment anxiety served as prototype for later relationships was partially supported by the

significant path from maternal to infant attachment anxiety. There was also partial support for the compensatory hypothesis from the path between maternal attachment anxiety and infant attachment avoidance that just failed to reach significance. The lack of association between maternal attachment anxiety and negative marital relations however appeared contrary to the prototype hypothesis. As attachment-related behaviour is expected to be expressed under conditions of stress or threat, it may be that this relationship is present at higher levels of attachment anxiety than were present in this study such as would be seen in a higher risk population.

Relations with maternal attachment avoidance were in support of the prototype hypothesis. Maternal attachment avoidance was related positively with maternal depression and infant attachment avoidance and negatively with difficult temperament and negative marital relations. Direct paths from maternal attachment avoidance at 4 months to parent-other and parent-child stress at 12 months however were not significant. In contrast to the findings for maternal attachment anxiety, it would appear that maternal attachment avoidance affects parent-other and parent-child stress indirectly via its relations with difficult temperament, maternal depression, negative marital relations and infant attachment avoidance. Thus the results of this study supported the prototype hypothesis for maternal attachment avoidance in a low risk population. However, given the direct paths from maternal attachment avoidance to parent-other and parent-child stress in the separate preliminary attachment model were not significant, there was no support for mediation of the effects of maternal attachment avoidance on parent-other or parent-child stress by maternal depression, negative marital relations or difficult temperament.

Maternal depression accounted for the paths from negative marital relations to parent-other and parent-child stress. Similarly, maternal depression accounted for the path from difficult temperament to parent-other stress. Hence maternal depression mediated the effects of difficult temperament on parent-other stress and negative marital relations on parent-other and parent-child stress. The dominance of

maternal depression in the prediction of parenting stress was consistent with prior research and family stress theory discussed in chapter three (Belsky, 1984; Chang & Fine, 2007; McCubbin & Patterson, 1983; Muslow, Caldera, Pursley, Reifman & Huston, 2002; Williford, Calkins & Keane 2007).

The significant path from difficult temperament to parent-child stress was consistent with past research (Chang & Fine, 2007; Muslow, Caldera, Pursely, Reifman & Huston, 2002; Östburg & Hagekull, 2000). Further, whereas prior research had demonstrated an association between difficult temperament in infants from one year onwards and parenting stress (Briggs-Cowan, Carter, Skuban & Horowitz, 2001; Williford, Calkins & Keane, 2007), this study demonstrated this association existed from temperamental difficulty as early as 4 months of age. Mothers' perception of her infant as difficult was found to be less influential in the prediction of parent-other versus parent-child stress in accordance with Belsky (1984).

Consistent with Abidin (1995) this study demonstrated the mother infant attachment relationship explained a significant amount of the variance in parenting stress. Specifically, infant attachment avoidance was negatively associated with parent-other and parent-child stress. This makes intuitive sense as an avoidant child is less likely to interact with or make many demands of their mother, thus minimising her parenting stress arising from her relationship with her child with associated flow on effects to her relationships with others. Somewhat surprisingly however, infant attachment anxiety was not found to predict either parent-other or parent-child stress. Perhaps the detrimental effects of elevated infant attachment anxiety on parenting stress are evident only at higher levels of anxiety than were observed in this low risk sample or in the context of higher risk. Thus this low risk study demonstrated that mothers' own anxiety was more important than her infant's attachment anxiety in determining her reported levels of parenting stress.

Thus this study demonstrated parenting stress in mothers with a 12 month old infant was best predicted by characteristics of both mother and child. Major findings that addressed highlighted gaps in the literature included empirical testing of a

theoretically derived parenting stress model; the demonstration of common and differential paths to different components of parenting stress; the direct effect of maternal attachment anxiety on parenting stress over and above its effects on maternal depression and the mother-infant attachment relationship; mediation of the effect of negative marital relations by maternal depression; and a direct effect of early infant difficult temperament on parent-child but not parent-other stress. Positive marital relations was not found to be influential in the development of mothers' parenting stress across infancy. Concurrent effects of the mother-infant attachment relationship on parenting stress were limited to a negative effect of infant attachment avoidance, along with a minimal effect of infant attachment anxiety.

Consistent with expectation, relations were stronger between negative marital relations and parent-other than parent-child stress. However, findings indicated maternal depression accounted for any direct effects of negative marital relations on parenting stress. Thus a mother's negative relations with her spouse indirectly influenced her parenting stress, particularly in the parent-other domain, via their effect on her depression. It makes sense that at this early, intensive stage of parenting, characteristics of her infant and her relationship with her infant were more salient in predicting a mother's parenting stress than characteristics of her relationship with her spouse. Maternal depression and not marital relations partially mediated the effects of maternal attachment anxiety and difficult temperament on subsequent parenting stress. It would seem that the supportive role played by the spouse is not as influential relative to maternal and child characteristics in determining a mother's parenting stress during infancy in a community sample.

6.4.5 Limitations

There were several limitations to the analyses conducted in this chapter. Firstly, although a longitudinal study, conclusions of causality would have been stronger with three and not the two waves of data available in the current study. Secondly, although hypothesised relations between 4 month constructs were grounded in theory and prior research, they represent just one possibility. Other

models not tested in this study may also expain the observed correlations amongst the constructs. Thirdly, larger numbers would have enabled path analyses to be replaced with error free structural equation modelling which would also have increased the strength of conclusions able to be drawn from the analyses. Fourthly, with the exception of the attachment measures, all other constructs were assessed by maternal self-report, thus relations between these constructs may have been overestimated due to shared method variance and construct overlap. Fifth, findings are restricted to the current middle class Australian community sample and require replication in more hetorgeneous samples. Sixth, it is possible sample heterogeneity, arising from sources such as mother-infant separation and variation in family size, that were not controlled in the analyses, provided some confounding of the results. Finally, the construction of the maternal and infant attachment anxiety and avoidance scores were guided by separate pcas. There are other possible conceptualisations of these attachment dimensions that are yet to be tested.

6.5 Summary and conclusions

This study used path analysis to investigate simultaneously direct and indirect effects to mothers' parent-other and parent-child stress when their infants were 12 months old from maternal attachment anxiety and avoidance, maternal depression, negative and positive marital relations, and infant difficult temperament when infants were 4 months old and concurrent infant attachment anxiety and avoidance. The main predictors of both parent-other and parent-child stress were maternal attachment anxiety, negative infant attachment avoidance, maternal depression and difficult temperament. Their relative influence varied with the type of parenting stress.

Difficult temperament and maternal depression at 4 months were the most important predictors of parent-child stress at 12 months. In contrast, along with maternal depression, maternal attachment anxiety was more important than difficult temperament in the prediction of parent-other stress at 12 months. Paths

from maternal attachment avoidance, negative marital relations and infant attachment anxiety to parent-other and parent-child stress were not significant.

This chapter addressed the gap highlighted by Östburg and Hagekull (2000) of the lack of a parenting stress model that included personal characteristics and relationship stressors. Using a reconceptualisation of Belsky's (1984) determinants of parenting model, analyses in this chapter have demonstrated maternal characteristics of depression and attachment anxiety assessed when infants were just 4 months old and negative, concurrent infant attachment avoidance, determine both parent-other and parent-child stress in mothers of 12 month old infants. A mother's relationship with her spouse was found to be less influential than maternal characteristics in determining parenting stress.

Previous research had focused on total parenting stress. This study addressed the possibility raised by Grant and colleagues (Grant et al., 2003; McMahon, Grant, Compas, Thurm & Ey, 2003), of different pathways to different types of parenting stress. Findings supported both common and differential pathways to parent-other versus parent-child stress. There were common pathways from maternal attachment anxiety and depression and negative infant attachment avoidance. Difficult temperament was more influential in determining parent-child stress whereas maternal attachment anxiety and negative marital relations had a greater effect on parent-other stress.

This study included an investigation of the effects of maternal and infant attachment anxiety and avoidance on parenting stress. This was possible due to the representation of the attachment construct by two continous attachment dimensions rather than the traditional attachment classifications as discussed in chapter four. Dimensional and not categorical representation increased statistical power and captured variance from secure as well insecure levels of attachment anxiety and avoidance. Whilst prior research had demonstrated dimensionality of the attachment construct, this was the first study to incorporate dimensionality of both maternal and infant attachment into the study design. This represented a new

perspective in attachment research which can be expected to lead to further developments and understanding of the roles of attachment strategies in interpersonal relationships.

Significant in this study was the investigation of potential protective effects from positive marital relations which have been postulated but not tested empirically previously. This study found there was no direct protective effect from positive marital relations in low risk mothers. Whilst the integrated path model explained around half of the variance in parent-other and parent-child stress, the significant residuals indicated additional constructs and/or pathways were needed to explain variance over and above that explained by the maternal, child and relationship constructs used in this study. Analyses in this chapter focused on direct and indirect effects of maternal, child and relationship constructs. Human development has been characterised in the literature as involving complex interactions between constructs that unfold over time. Thus in addition to the direct and indirect pathways investigated in this study, it is likely moderating effects involving interactions amongst constructs may shed further light on the development of mother's early parenting stress. The next chapter will investigate the proposed central, organising role of parenting stress compared with the potentially differential effects of dimensions of attachment anxiety and anxiety on the development of toddler internalising and externalising problem behaviours.

Chapter 7

Investigation 2: Maternal, child, contextual and relationship risk and protective factors in the first two years of life for toddler internalising versus externalising problem behaviours

Chapter 7 Investigation 2: Maternal, child, contextual and relationship risk and protective factors in the first two years of life for toddler internalising versus externalising problem behaviours

7.1 Introduction

Internalising and externalising problem behaviours have been shown to emerge early, from two years of age, and be related to poorer developmental outcomes as described in chapters one and two. Different risk profiles and developmental pathways for internalising versus externalising problem behaviours have been demonstrated in preschoolers and older children. The need to increase knowledge of the etiology of problem behaviours in infants and toddlers to inform early prevention and intervention programs has been highlighted in the literature.

The relevance of individual factors such as maternal attachment and depression and infant difficult temperament, relationship factors such as marital relations and infant attachment, and family context variables such as parenting stress, in the development of infant problem behaviours was discussed in the literature review chapters. However the lack of studies of theoretically driven, integrative empirical models linking attachment and normative family stress to specific problem behaviours particularly in low risk, infant populations was identified as a significant gap in the knowledge.

Much of the attachment research to date has also been limited by reduced power resulting from small samples and the reliance on either the undimensional attachment security construct or the three-way attachment classifications. Many studies were also limited in scope, with very few considering the direct and interactive effects of

attachment, infant temperament and family context together. Studies have also tended to consider total problem behaviours rather than delineating specific pathways to internalising versus externalising problem behaviours, although there has been somewhat more attention paid to the latter in recent research.

7.1.1 Early maternal and infant risk factors for toddler internalising and externalising problem behaviours

Maternal attachment anxiety and avoidance and maternal depression are considered in this study as maternal characteristics hypothesised to affect the development of toddler internalising and externalising problem behaviours. Early infant difficult temperament is viewed as a chiefly constitutional infant characteristic that is also expected to be important in the development of toddler problem behaviours.

In chapter four it was postulated the specific restrictions in self-regulation associated with dimensions of maternal attachment anxiety and avoidance may explain paths to child internalising versus externalising problem behaviours respectively. There has been some empirical support for the hypothesised pathways in preschool and older children presented in chapter four. However there has been very little research involving infants and almost no research using attachment dimensions rather than classifications. The relationships between maternal attachment anxiety and avoidance and toddler internalising and externalising problem behaviours in a low risk infant population will be tested empirically in this study. Potential differential effects of idealising, derogatory and lack of memory avoidant strategies and passivity versus angry anxious attachment strategies will also be investigated.

Infants of depressed mothers have been shown to cope either by withdrawing to avoid conflict and negativity, or by approaching and demanding attention and responsivity. Thus, whilst it remains an important developmental construct, maternal depression appears to be a generic risk factor for problem behaviours with no specific

hypotheses regarding its relative importance on the development of internalising versus externalising problem behaviours.

Early social emotional difficulty, characterised by mothers' reported difficulties establishing sleeping, feeding and settling routines with their infant, may be associated with subsequent toddler problem behaviours. No specific pathways from global socioemotional difficulty to internalising versus externalising problem behaviours are suggested. Alternatively, early infant socioemotional difficulties may be mostly resolved by the end of the first two years of life and be largely unrelated to a toddler's expression of emotion dysregulation through internalising and externalising problem behaviours.

The literature review chapters highlighted greater susceptibility to environmental risk factors and the development of internalising and externalising problem behaviours in temperamentally difficult infants. Different aspects of difficult temperament have been associated with internalising versus externalising problem behaviours. Recent research presented in chapter two has demonstrated associations between early childhood attentional problems, impulsivity, unmanageability, fussiness, high reactivity and approach, and low fearfulness in the first year and subsequent toddler externalising problem behaviours. There is very little knowledge on the effects of early temperament on the development of internalising problem behaviours. This may be due partly to the widely held belief that internalising problem behaviours appear later than externalising problem behaviours, from preschool onwards.

Thus differential associations from aspects of difficult temperament with toddler internalising versus externalising problem behaviours are expected. Early infant difficult temperament in this study was assessed using three scales of *Unapproachability/ unadaptability*, *Uncooperativeness/unmanageability* and *Irritability* using the SITQ as described in chapter six (Sanson, Prior, Oberklaid, Garino & Sewell, 1987). Items in the *Unapproachable/unadaptable* scale are similar to measures of behavioural inhibition

that have been related to internalising problem behaviours. Alternatively, unapproachable/ unadaptable infants may become angry, resistant toddlers and exhibit externalising problem behaviours. The *Uncooperative/ unmanageable* difficult temperament scale may represent in part, behavioural disinhibition which has been associated with externalising problem behaviours such as defiant non compliance or aggression. Results from prior research discussed in chapter two suggested infants with elevated *Irritability* scores may manage their distress using externalising problem behaviours. However high infant *Irritability* may also be associated with high toddler negativity that has been associated with internalising problem behaviours.

Thus mother reported toddler externalising problem behaviours could be expected to be associated with each of the difficult temperament scales. Internalising problem behaviours are expected to be more associated with the *Unapproachable/ unadaptable* and *Irritability* scales than the *Uncooperative/ unmanageable* scale. Whilst individual scales may be differentially associated with internalising versus externalising problem behaviours, the level of overall problem behaviours may increase with increasing pervasive difficultiness across all three domains. This study will examine the contribution of each scale and their combined effect in the prediction of toddler internalising versus externalising problem behaviours. Finally, consistent with research discussed in chapter two, no gender differences in problem behaviours were expected amongst two year old toddlers.

7.1.2 Associations between relationship factors and toddler internalising and externalising problem behaviours

Chapter one emphasised infants develop their social and emotional skills through interactions with their primary caregivers in their close relationships. As discussed in chapter two, quality of early care is purported to be a key determinant of a child's developing stress reactivity and coping skills. Emotional restrictions in the mother-infant attachment relationship are purported to be related to the development of internalising

and externalising problem behaviours. As discussed in chapter four, there is a substantial body of research demonstrating small direct effects of infant attachment insecurity on child problem behaviours. There has been some support for a greater influence of infant attachment on the development of internalising than externalising problem behaviours.

According to the widely assumed differential outcome hypothesis, infant attachment avoidance is purported to lead to externalising problem behaviours and infant attachment anxiety to internalising problem behaviours. Due to the low numbers of insecurely attached infants in low risk populations and the small sample sizes traditionally used in attachment research, research concerning the differential outcome hypothesis has been limited and inconclusive. This is an important limitation and represents a significant gap in the knowledge concerning the etiology of internalising versus externalising child problem behaviours. This study will use continuous dimensions of infant attachment anxiety and avoidance to increase predictive power and test the differential outcome hypothesis directly. An investigation of pathways from attachment anxiety and avoidance has the potential to elucidate developmental mechanisms.

Support for pathways from infant attachment avoidance and anxiety to both internalising and externalising problem behaviours, particularly in high risk populations of older children with insecure levels of attachment, was presented in chapter five. These have yet to be empirically validated however in a low risk toddler population. The avoidance-internalising pathway is consistent with elevated attachment avoidance as overcontrol, which has been associated with internalising problem behaviours described in the first chapter. Most of the literature has presumed a link between attachment anxiety and internalising problem behaviours. However, undercontrol has been associated both with children with attachment anxiety and externalising problem behaviours.

Thus, contrary to purported but largely untested associations in the attachment literature, it is expected one year old infants with elevated attachment anxiety or avoidance may display either internalising or externalising problem behaviours. Specific pathways may depend upon interactions among other factors and motivators of behaviour, such as parenting stress and temperament, consistent with the multifinality premise. The predictive utility of infant attachment over and above the effects of continuity in risk has rarely been demonstrated. This study will address this gap by integrating risk and attachment variables in a single study.

As relational measures, positive and negative marital relations are affected by individual characteristics from both partners, including genetic predispositions, personality and psychopathology, and contribute to the emotional quality of the rearing environment. This study will investigate empirical direct, mediated and moderated effects of negative versus positive marital relations on toddler's internalising versus externalising problem behaviours. Consistent with prior marital conflict research discussed in chapters two and three, negative marital relations are expected to be associated with increased toddler problem behaviours, both internalising and externalising (Repetti, Taylor & Seeman, 2002). Negative marital relations were hypothesised to exert their effect on toddler behaviour both directly and indirectly via parenting stress. The opposite effect is expected from positive marital relations, namely that they will be associated with decreased toddler problem behaviours. In accordance with the parenting stress model of infant development developed in chapter three, a smaller effect size of marital relations on toddler problem behaviours is expected compared with more proximal factors impacting the infant's development such as parenting stress and difficult temperament. Marital relations may be expected to be more influential in the development of toddler externalising than internalising problem behaviours.

7.1.3 Parenting stress as a key organising construct for the development of toddler internalising and externalising problem behaviours

Discussion in chapter three conceptualised parenting stress as a key organising construct for the development of internalising and externalising problem behaviours in young children. Research demonstrated moderate to high effect sizes between mostly concurrent associations of parenting stress and preschoolers' internalising and externalising problem behaviours. Associations with externalising problem behaviours have been reported for infants in high and low risk populations. Associations between parenting stress and toddler internalising problems however have not been investigated. Thus no specific predictions are evident from the literature regarding relations between parenting stress and toddlers' internalising versus externalising problem behaviours.

The scant investigation of potential differential effects from different sources of stress was noted in chapter three. Stress arising from dysfunctional parent-child interactions was related to internalising problem behaviours whereas stress arising from a child's difficult temperament was related to both internalising and externalising problem behaviours. This study will investigate potential differential effects on the development of toddler internalising versus externalising problem behaviours from stress arising from a mother's relationship with her infant (parent-child stress), compared with stress arising from a mother's relationships with others outside the mother-infant relationship (parent-other stress), compared with life event stress. Whilst both internalising and externalising problem behaviours have been shown to be highly heritable, internalising behaviours appear to be more so. Similarly, whilst both internalising and externalising problem behaviours are expected to be affected by rearing environment, externalising problem behaviours have been shown to be more so.

Thus, as parent-other stress is expected to contribute to a stressful rearing environment for the infant, it is expected to be relatively more important for the

development of toddler externalising problem behaviours. Parent-child stress is particular to the parent-infant relationship and may be more related to genetic predispositions. Thus parent-child stress is expected to be relatively more important for the development of toddler internalising problem behaviours. Life event stress is expected to be a generic predictor of toddler problem behaviours with no particular pathways indicated to internalising versus externalising problem behaviours.

Developmental research has been criticised for its lack of consideration of transactional and multiplicative models. Discussion in chapter one acknowledged the complexity of development and asserted the development of toddler internalising and externalising problem behaviours was likely to involve both moderating and mediating pathways amongst infant characteristics, the mother-child relationship and other aspects of the rearing environment such as parenting stress, maternal depression and marital relations. Associations between parenting stress and infant problem behaviours may represent the net effect of multiple interacting factors.

The central organising role of parenting stress in the development of toddler problem behaviours was discussed in chapters two and four. In accordance with the reconceptualisation of Belsky's (1984) determinants of parenting model discussed in chapter three, it was proposed maternal and child characteristics affected marital and mother-infant relationships which, in turn affected parenting stress, which then influenced the development of toddler problem behaviours. Results of the investigations of paths to parenting stress in chapter six provided partial support for this proposal. Thus parenting stress may mediate or moderate the effects of maternal and infant anxiety, maternal depression and infant difficult temperament.

Positive marital relations may ameliorate the effect of risk, such as parenting stress, on the development of toddler internalising and externalising problem behaviours. Buffering effects however may not apply in low risk community samples.

This study will investigate the potential moderation of the effect of parenting stress on the development of toddler internalising and externalising problem behaviours by positive marital relations. Analyses in this chapter will clarify the relations between maternal and infant individual and relational characterisics, parenting stress and toddler internalising and externalising problem behaviours by testing both mediation and moderation pathways and thus will help to address this gap in the knowledge.

7.1.4 Summary

The review chapters summarised above have provided some empirical support for main, indirect and moderated effects of infant and maternal attachment, maternal depression, positive and negative marital relations, parenting stress and difficult temperament in the development of internalising and externalising problem behaviours in toddlers. Studies have been limited however by their lack of integration of constructs from disparate bodies of research, use of attachment classifications rather than dimensions, a predominance of high risk samples involving older children beyond infancy and a lack of specificity of prediction.

This study will investigate specific direct, mediated and moderated pathways to toddler internalising versus externalising problem behaviours across the first two years of life. Infant attachment and avoidance and positive and negative marital relations represent relationship measures of early care quality. Infant difficult temperament will be used to measure a child's sensitivity to their rearing environment. Maternal factors include maternal attachment anxiety and avoidance and maternal depression. Parenting stress will be used as a central organising construct representing the quality of the infant's early rearing environment and their exposure to early stress. Potential differential effects from different sources of parenting stress will be investigated. Effects on total problem behaviours will also be investigated to shed light on risk factors for toddlers exhibiting both internalising and externalising problem behaviours.

Toddler internalising problem behaviours are expected to be directly affected by early maternal attachment anxiety and depression, either infant attachment anxiety or avoidance, negative marital relations, difficult temperament, particularly low approach and adaptability and high irritability, and concurrent parenting stress, particularly where stress is from the within the parent-child relationship. Mediation of the effects of early risk factors assessed when the infants were 4 and 12 months old by concurrent parenting stress at 24 months will be investigated. Direct effects from interactions amongst early risk factors and concurrent parenting stress are also expected. Moderation of the effect of early difficult temperament at 4 months by infant attachment assessed at 12 months will also be investigated.

Similar pathways may be expected for the prediction of toddler externalising problem behaviours. However negative marital relations and parent-other stress are expected to be relatively more important in the prediction of toddler externalising than internalising problem behaviours. Buffering effects from positive marital relations may be more important for externalising than internalising problem behaviours. Empirical testing will clarify whether prior dimensions of attachment anxiety and avoidance, difficult temperament and source of concurrent parenting stress differentiate between toddlers' internalising versus externalising problem behaviours in a low risk population.

In summary, whereas parenting stress may be a general predictor of problem behaviours, attachment anxiety and avoidance and aspects of difficult temperament have the potential to elucidate developmental pathways to internalising versus externalising problem behaviours. Interrelations amongst parenting stress, elevated maternal and infant attachment anxiety and avoidance and infant temperamental difficultiness are also expected to explain observed variance in toddler internalising and externalising problem behaviours. Protective factors such as positive marital relations, may buffer risk in low risk populations.

7.2 Method

7.2.1 Participants

Participants for this study were 47 mother-infant dyads who completed all three stages of data collection when the infants were 4, 12 and 24 months old as described in chapter six.

7.2.2 Measures

Background characteristics, maternal and infant attachment, maternal depression, positive and negative marital relations and parenting stress were assessed using the measures described in chapter six.

7.2.2.1 Social and emotional difficulty

Social and emotional difficulty across infancy was assessed at 4, 12 and 24 months using the Ages and stages socioemotional adjustment screening questionnaires (Squires, Bricker & Twombly, 2002). The ASQ:SE is a series of internationally validated screening questionnaires for detecting children aged 3 to 60 months at risk for social and emotional adjustment difficulties. The questionnaires contain 22 to 29 items concerning self-regulation and interaction and are answered by the child's caregiver. Caregivers are asked to rate each behaviour on a 3 point scale of "most of the time", "rarely" or "never" and to indicate whether a particular behaviour is a concern to them. Each questionnaire results in a total social and emotional difficulty score which can be compared with empirically derived cut off scores (Squires, Bricker, Heo & Twombly, 2001). These were derived from normative data based on 3,014 questionnaires and 1041 children in the United States. Cut-off scores for at risk social emotional difficulty are 45, 48 and 50 at 4, 12 and 24 months respectively. The authors reported there were no gender differences on ASQ:SE scores in infants aged between 3 and 24 months.

The ASQ:SE has been shown to have high sensitivity and correctly identified from 80% to 90% of children with mental health problems. It also has high specificity and correctly identified greater than 90% of children without mental health difficulties. The

ASQ:SE has acceptability internal consistency and reliability. Cronbach alphas for the 6, 12 and 24 month questionnaires are .69, .67 and .80 respectively. Test-retest reliability is 94% with one to three weeks between tests. It has demonstrated construct validity. Percentage agreement with the Child Behaviour Checklist (CBCL) and Vineland Social-Emotional Early Childhood Scale (SEEC) ranged from 81% to 95%, with an overall agreement of 93% (Bagner, Rodriguez, Blake, Linares & Carter, 2012; Salmonsson & Sleed, 2010; Squires, Bricker, Heo & Twombly, 2001). In a large normative sample, the authors found no gender differences in caregiver reported social and emotional difficulties for infants and toddlers aged between 6 months and 2 years.

7.2.2.2 Toddler internalising, externalising and total problem behaviours

The Child Behavior Checklist Revised (CBCL-R; Achenbach & Rescorla, 2000), provides three measures of infant socioemotional adjustment: total problem behaviours, internalising problem behaviours (problems within the self), and externalising problem behaviours (conflicts with other people). The internalising and externalising scores have been shown to be highly correlated with each other and with total problem behaviours (r=.59, r=.84 and r=.88 respectively; Achenbach & Rescorla).

The CBCL requires the parent to rate 99 problem behaviors as being either 0 (“not true of the child”), 1 (“somewhat true of the child”), or 2 (“very true or often true of the child”). Ratings are summed to form raw scores across seven scales. An internalising raw score was obtained from the sum of the Emotionally Reactive, Anxious/Depressed, Somatic Complaints, and Withdrawn scales. An externalising raw score was obtained from the sum of the Attention Problems and Aggressive Behavior scales. The total problems raw score is the sum of the internalising and externalising raw scores plus 33 “other problems” items. Borderline clinical raw scores are above 14 for internalising, 21 for externalising, and 52 for total problem behaviours (i.e. between the 83rd and 90th percentiles).

The CBCL has good test-retest reliability (1 week, N= 68, internalising, r=.90, externalising, r=.87, total, r=.90, p<.01). There is significant cross-informant agreement on the internalising (r=.59, p<.01), externalising (r=.67, p<.01) and total scores (r=.65, p<.01). Scores have been shown to be stable over 12 months (internalising, r=.76, externalising, r=.66, total, r=.76, p<.01). The content validity of the CBCL items has been demonstrated by their discrimination between referred and nonreferred children. The CBCL has demonstrated construct validity being related to other concurrent and subsequent problem behaviour measures (Achenbach & Rescorla, 2000).

7.2.3 Procedure

When their child was two years old, mothers were mailed the package of questionnaires described in chapter six.

7.2.4 Statistical procedures

SPSS software (SPSS Inc., 2001), was used for preliminary data analyses, correlations, Anovas and regression analyses. Anovas and Chi square analyses were conducted to compare background characteristics of the participants at 24 months with those who participated in the original 4 month and subsequent 12 month stages of the study. These have been described earlier in chapter six and are presented in Appendix 5. There were no differences in the distributions of mother and father education, family income level, maternal age and employment, mother-child separation, child gender, number of older siblings, parental relationship length and solo parenting.

Linear regression analyses were used to investigate the hypothesised prediction of parent reported internalising, externalising and total problem behaviours in their 2 year old toddlers from the predictor variables.. Effect sizes were interpreted in accordance with Cohen (1988) with f^2 =.20, .35 and .50 representing small, medium and large effects respectively. Centred scores were used to reduce potential issues with multicollinearity, or shared variance, between predictors. Tolerance levels were above

.20, indicating acceptably low levels of collinearity amongst predictors. Stevens (2009) recommended at least 15 subjects per predictor in regression analyses.

Due to limitations resulting from the small sample size (N=47), at this stage of the study and also to more clearly delineate the hypothesised relations amongst the predictors and parenting stress, separate regressions were run for pairs of predictors, where one predictor was either parent-other, parent-child or life event stress. The direct effect of the predictor alone was entered first, followed by the direct effects of the predictor and the stress construct. Moderation, where the level of one variable affects the strength or direction of the relation between another variable and the outcome, was tested by entering the interaction between the two constructs into the regression equation after their direct effects had been tested. Squared zero order correlations represented the amount of shared variance between the predictor and the outcome variable. Some of this variance may also be common with other correlated third variables. Squared semi partial correlations represented the unique variance explained by each predictor and are included in the tables presented in the Results section of this chapter.

Parenting stress was hypothesised to mediate the effects of the other predictors on toddler internalising, externalising and total problem behaviours. Mediation involves one variable accounting for the some or all of the relation between another predictor and the outcome variable (Baron & Kenny, 1986; Holmbeck, 1997). For mediation to be supported both constructs must be significant predictors on the outcome variable on their own, they must also be significantly associated with one another, and lastly, the relation between with the outcome variable must be reduced as a consequence of adding the mediating variable into the regression equation. This study will test for mediation pathways using less stringent criteria than Baron and Kenny's that have been proposed for small to medium effects (MacKinnon, Lockwood, Hoffman, West & Sheets,

2002; Shrout & Bolger, 2002). These do not require the predictor to be significantly associated with the outcome variable for mediation to occur.

Mothers were expected to be more accurate judges of their child's behaviours at two years as they have generally spent more time with the child and hence may have seen their child's behaviour across a wider range of situations than the father. Given the similar patterns of correlations across mothers and fathers, regression analyses used mother reports of their toddler's problem behaviours at two years of age.

Missing data was less than 5% for all measures used in this chapter at 4, 12 and 24 months with the exception of parent-other stress. Three mothers, 6.4%, of the sample, had incomplete PSI data precluding calculation of their parent-other stress score.

7.3 Results

7.3.1 Participant characteristics

Participants have been described in chapter six. There were 48 mother-infant dyads who returned the questionnaires when the infants were 24 months old. One mother was omitted from the analyses due to incomplete data. Participants at this stage of the study were shown to be representative of the original sample in chapter six.

7.3.2 Maternal, infant and relationship risk and protective factors across infancy

Maternal attachment anxiety and avoidance, marital relations, difficult temperament and maternal depression measured when infants were 4 months old and infant attachment anxiety and avoidance measured when infants were 12 months old were described in chapter six. Mean scores, significance tests from planned comparisons investigating any differences across infancy and correlations across infancy are presented in Appendix 9. On average levels of maternal depression and negative marital relations did not differ across infancy. Mothers reported higher positive marital relations, infant difficult temperament and life event stress when their infants were 4

months compared with 12 and 24 months of age. Overall average levels were low consistent with the low risk nature of the sample.

7.3.2.1 Social emotional difficulty when infants were 4months old

The social emotional difficulty scale had accapetable reliability (α=.69). On average mothers reported relatively low levels of social emotional difficulty well below at risk levels in their infants aged 4 months ($\overline{X}$=25.44 and $\overline{SD}$=2.61). Mothers rated 14%, of their 4 month old infants with elevated social emotional difficulty scores.

7.3.2.2 Parenting stress when infants were 24months old

There was good internal consistency for the parent-other and parent-child stress scales (α=.90 and α=.77 respectively). Parenting stress levels reported by mothers were generally low. On average mothers reported higher stress in the parent domain, around the 50th percentile compared with the child domain, around the 30th percentile. Less than 10% of mothers had elevated parent-child stress scores compared with approximately one fifth of mothers with elevated parent-other stress scores. At 24 months parent-child relationship stress was strongly related to parent-other stress (r=.72, p<.01).

7.3.3 Toddler internalising, externalising and total problem behaviours at 24 months of age

There was good internal consistency for the internalising, externalising and total problem behaviour scales (α=.74, α=.86 and α=.91 respectively). Overall both mothers and fathers reported low levels of internalising, externalising and total problem behaviours at levels well below the 50th percentiles in their two year old children (Table 7.1). Average parent reported internalising problem behaviour scores were well below the sub clinical cut off or borderline clinical raw score of 14. There were 3 out of 47 children who were rated by either parent as being in the borderline clinical range for internalising problem behaviours. There were eight fathers and four mothers who reported no internalising behaviours for their toddler. As for internalising behaviours,

the average externalising problem behaviour scores reported by both mothers and fathers were well below the sub clinical cut off or borderline raw score of 21. There were seven parents who reported toddler externalising problem behaviours at levels just above this score. There were eight fathers and two mothers who reported no externalising behaviours for their toddler. Similarly, average total problem behaviour scores reported by both mothers and fathers were well below the sub clinical cut off or borderline raw score of 52. There were three mothers and two fathers who reported toddler total problem behaviours at levels just above this score. There were six fathers who reported no total problem behaviours for their toddler. Mothers and fathers did not differ on the level of reported internalising problem behaviours in their two year olds. Mothers reported significantly higher levels of externalising and total problem behaviours than fathers.

Table 7.1

Mother and father reported internalising, externalising and total problem behaviours in their 24 month old toddlers

	Mother		**Father**		**F**
Toddler problem behaviours	Mean	*(SD)*	Mean	*(SD)*	
Internalising	4.88	*(3.84)*	4.15	*(3.82)*	F(1,47)=1.23
Externalising	11.33	*(6.26)*	9.40	*(6.58)*	F(1,47)=4.36*
Total problem behaviours	27.81	*(14.13)*	22.79	*(16.62)*	F(1,46)=5.08*

*p<.05, **p<.01, N=47

7.3.4 Associations amongst mother and infant characteristics, marital relations at 4 months, infant attachment at 12 months and toddler problem behaviours and parenting stress at 24 months

Associations amongst the hypothesised predictors of toddler problem behaviours are presented in Table 7.2. Overall associations between the predictors at 4 and 12 months and life event stress at 24 months were small to trivial (r<.3; Cohen, 1988). The associations between maternal depression, infant difficult temperament and social emotional difficulty at 4 months and parent-other and parent-child stress at 24 months were positive and large (r>.5; Cohen). Maternal attachment avoidance at 4 months had a moderate (.3<r<.5; Cohen), negative relationship with parent-other stress and a small negative relationship with parent-child stress at 24 months. Maternal attachment anxiety at 4 months had a small positive relationship with parent-other stress and a trivial relationship with parent-child stress at 24 months. Both positive and negative marital relations at 4 months had a trivial (r<.1; Cohen) relationship with parent-child stress and a small relationship with parent-other stress at 24 months. Positive marital relations were negatively associated with parent-other stress. There were small positive associations between infant attachment anxiety at 12 months and parent-other and parent-child stress at 24 months. Associations between infant attachment avoidance and parent-other and parent-child stress at 24 months were trivial.

Study constructs were largely unaffected by levels of background characteristics at 4 months. There were no significant associations between background variables including maternal age, number of siblings, parental relationship length, maternal or paternal education, family income, maternal employment, and mother reported internalising, externalising and total problem behaviours in their two year old children (Appendix 8).

Correlations between the risk and protective factors across infancy and toddler internalising, externalising and total problem behaviours at 24 months are shown in

Table 7.2. Patterns of associations were similar for father and mother reported toddler risk and protective factors across infancy. Maternal depression, infant difficult temperament and social emotional difficulty at 4 months and both concurrent parent-other and parent-child stress were moderately to strongly positively associated with mother or father reported internalising, externalising or total problem behaviours in their two year old toddlers. Associations with the remaining predictors including maternal and infant attachment avoidance, positive and negative marital relations and life events stress were small to trivial. An exception was a moderate positive association between infant attachment avoidance and mother reported internalising problem behaviours. Lastly, toddler internalising problem behaviours were moderately to strongly associated with externalising problem behaviours and strongly associated with total toddler problem behaviours for both mother and father reports.

7.3.5 Investigation of direct, mediated and moderated effects of maternal, infant, contextual and relationship factors with parent-other and parent-child stress at 24 months on concurrent mother reported toddler internalising, externalising and total problem behaviours

Results of the linear regressions are presented in Table 7.3. Overall, regression models explained more variance in toddler internalising and total problem behaviours than in externalising problem behaviours. Given the lack of association between life event stress and internalising, externalising or total problem behaviours reported earlier, no regressions were run using life event stress as the intervening variable. Patterns of prediction were similar regardless of the source of stress however there were some differences which will be discussed below.

Table 7.2

Associations between maternal, child and relationship risk and protective factors and mother and father reported internalising, externalising and total problem behaviours in their two year old toddlers

	4 months							12 months		24 months								
										Parenting stress			Toddler problem behaviours					
Measures	Mav	Max	Dep	PosMR	NegMR	Dif	SE Dif	Iav	Iax	Oth	Chi	LE	Int-M	Int-F	Ext-M	Ext-F	Tot-M	Tot-F
4 months																		
Maternal attach avoid		-.44**	-.07	.09	-.27**	-.17	-.07	.23*	-.08	-.37*	-.10	-.22	-.01	.02	.03	.01	-.03	-.03
Maternal attach anx			.26**	.01	.20*	.02	.12	.02	.24*	.30*	.04	.13	-.16	-.18	-.07	-.02	-.09	.00
Maternal depression				-.15	.39**	.40**	.52**	.13	.00	.63**	.57**	.26	.61**	.48**	.42**	.15	.60**	.26^
Positive marital rels					-.28**	-.09	-.07	.10	.02	-.15	-.06	.16	-.09	-.06	.02	.06	-.08	.09
Negative marital rels						.21*	.17	.01	.01	.17	-.02	-.01	.09	.11	.03	.00	.10	.01
Difficult temperament							.45**	-.08	.11	.48**	.53**	.02	.48**	.45**	.46**	.22	.56**	.23
Social emotional dif								.10	-.04	.48**	.54**	.00	.68**	.58**	.53**	.21	.71**	.23
12 months																		
Infant attach avoid									-.19*	-.04	-.05	-.05	.34*	.36*	.07	-.05	.20	-.08
Infant attach anx										.27	.17	-.13	-.15	-.13	-.04	.04	-.04	.08
24 months																		
Parent-other stress											.72**	.31	.47**	.52**	.41**	.31*	.58**	.40**
Parent-child stress												.06	.53**	.44**	.49**	.43**	.59**	.43**
Life event stress													.02	.16	.09	.17	.04	.16
Internalising -M														.31*	.49**	.24	.82**	.30*
Internalising -F															.49**	.79**	.44**	.91**
Externalising -M																.52**	.85**	.54**
Externalising -F																	.46**	.94**
Total problem -M																		.52**
Total problem-F																		

^p<.10, '*p<.05, **p<.01

With the exception of maternal depression, social emotional difficulty at 4 months and covarying problem behaviours, concurrent parent-other and parent-child stress were the strongest predictors of mother reported toddler internalising, externalising and total problem behaviours. Direct effects of covarying problem behaviours, parent-other and parent-child stress, maternal depression, difficult temperament and social emotional difficulty on infant problem behaviours were moderate (Cohen's f^2>.15) to large (Cohen's f^2>.35). Direct effects of maternal and infant attachment anxiety and avoidance were generally small (Cohen's f^2<.05). The effect of infant attachment avoidance however on mother reported internalising problem behaviours was small-moderate (Cohen's f^2=.12). Positive and negative marital relations had no direct effects on mother reported toddler internalising, externalising or total problem behaviours.

Mediation by parent-other or parent-child stress was inferred from a drop in variance explained by the predictor after the addition of the stress intervening variable in the regression equation. Both parent-other and parent-child stress at least partially mediated the effects of maternal depression, infant difficult temperament and social emotional difficulty. However maternal depression explained substantially more variance than parent-other or parent-child stress in internalising problem behaviours. Similarly, although social emotional difficulty at 4 months was partially mediated by parent-other and parent-child stress at 24 months, it continued to explain relatively more variance in internalising, externalising and total problem behaviours.

Parent-child stress explained more variance in externalising problem behaviours than covarying internalising problem behaviours which in turn explained more variance than parent-other stress. Similarly, parent-child stress explained more variance than externalising problem behaviours in internalising problem behaviours. The amount of variance explained by direct effects of maternal and infant attachment anxiety and avoidance increased when parent-other or parent-child stress was included in the regression equation. This was likely due to there being more shared variance to explain.

Thus neither concurrent parent-other nor parent-child stress mediated the effects of maternal and infant attachment anxiety and avoidance on mother reported toddler internalising, externalising or total problem behaviours.

There were several significant interaction effects between predictors at 4 or 12 months and either parent-other or parent-child stress at 24 months. Moderation effects were generally small to moderate. The interactions between positive marital relations at 4 months and parent-other and parent-child stress at 24 months approached significance and had a small effect on the prediction of mother reported toddler externalising problem behaviours. Somewhat counter intuitively, higher positive marital relations were associated with a greater effect of parent-other or parent-child stress. The negative interaction between positive marital relations and parent-child stress approached significance as a predictor of mother reported internalising problem behaviours. Higher positive marital relations at 4 months decreased the effect of parent-child stress at 24 months on toddler internalising problem behaviours. Thus whereas positive marital relations did not have a direct effect on toddler problem behaviours their interactions with parent-child and parent-other stress affected toddler internalising and externalising but not total problem behaviours.

Parent-other and parent-child stress negatively moderated the effect of early maternal depression on mother reported externalising problem behaviours in their two year olds. The negative interaction between social emotional difficulty at 4 months and parent-child stress at 24 months was a significant predictor of mother reported externalising problem behaviours at 24 months and approached significance with parent-other stress. Thus the higher a mother's concurrent parent-other or parent-child stress the less effect maternal depression or social emotional difficulty at 4 months had on mother reported toddler externalising problem behaviours at 24 months. Negative interactions between covarying internalising problem behaviours and both parent-other

and parent-child stress were also significant predictors of mother reported toddler externalising problem behaviours.

Toddler internalising problem behaviours were predicted by negative interactions between both parent-other and parent-child stress and maternal attachment anxiety represented by *Involving anger with father*. The higher the concurrent stress the less effect maternal attachment anxiety at 4 months had on toddler internalising problem behaviours. There were positive significant interactions between parent-other and parent-child stress at 24 months and toddler and infant difficult temperament at 4 months and infant attachment avoidance at 12 months on mother reported toddler internalising problem behaviours. The more difficult the infant's early temperament and the higher their attachment avoidance the greater the effects of concurrent parenting stress on internalising problem behaviours at 24 months. Lastly, parent-other stress moderated the effect of maternal depression on toddler total problem behaviours. The higher the mother's parent-other stress, the weaker the effect maternal depression at 4 months had on toddler total problem behaviours.

7.3.5.1 Predicting toddler problem behaviours from difficult temperament subscales

Prediction of toddler internalising problem behaviours from the *Unapproachable/ unadaptable* scale approached significance in both the parent-other and parent-child stress regression models. The *Unapproachable/ unadaptable* scale predicted more variance in toddler internalising, 7%, than externalising, 2%, problem behaviours in both the parent-child and parent-other stress regression models. Both parent-other and parent-child stress mediated the effect of *Unapproachable/ unadaptable* temperament with less variance explained when the intervening concurrent stress variable was entered in the regression equation. There were no significant interactions between *Unapproachable/ unadaptable* temperament at 4 months and either concurrent parent-other or parent-child stress in the prediction of toddler internalising, externalising or total problem behaviours.

Uncooperativeness/unmanageability in 4 month old infants predicted internalising, externalising and total problem behaviours in the parent-child and parent-other stress regression models. *Uncooperativeness/unmanageability* explained more variance in externalising than internalising problem behaviours, 21% versus 14% respectively, and explained more variance in toddler problem behaviours than concurrent parent-other or parent-child stress. This difference was particularly significant for the prediction of toddler externalising and total problem behaviours. The effect of infant *Uncooperativeness/unmanageability* on problem behaviours was partially mediated by concurrent parent-other and parent-child stress. This was particularly the case for toddler internalising problem behaviours. The amount of variance in toddler internalising problem behaviours explained by *Uncooperativeness/ unmanageability* became non-significant as a result of mediation by both parent-other and parent-child stress. The interaction between parent-other stress and *Uncooperativeness/unmanageability* also explained a significant amount of toddler internalising problem behaviour variance. The higher maternal reported parent-other stress, the greater the effect of infant *Uncooperativeness/unmanageability* at 4 months on toddler internalising problem behaviours.

The *Irritability* scale predicted internalising, externalising and total problem behaviours in the parent-child and parent-other stress regression models. Thus maternal reported *Uncooperativeness/ unmanageability* and *Irritability* in their 4 month old infants were generic predictors of toddler problem behaviours with moderate effect sizes and did not discriminate in their prediction of internalising, externalising and total problem behaviours. However *Uncooperativeness/ unmanageability* was a stronger predictor of externalising than internalising problem behaviours. Conversely, *Unapproachability/unadaptability*, although a weaker predictor overall with small effect sizes, was a stronger predictor of internalising than externalising toddler problem behaviours.

7.3.5.2 Predicting toddler problem behaviours from maternal attachment avoidance and anxiety subscales

Results of the regressions predicting toddler problem behaviours from the maternal attachment subscales are presented in Table 7.3. The prediction of mother reported internalising, externalising and total problem behaviours by maternal attachment avoidance approached significance in the parent-other but not parent-child stress regression models. It was possible the different aspects of maternal attachment avoidance and anxiety discussed in chapter five had different effects on toddler problem behaviours. Separate analyses were conducted using the individual AAI SOM scale scores in place of the global maternal attachment dimensions. Maternal attachment avoidance was parsed into its constituent AAI dismissing state of mind scales of *Idealisation of mother* and *father*, *Lack of memory* and *Derogation of mother* and *father*.

Idealisation of mother approached significance as a negative predictor of mother reported toddler internalising problem behaviours in the linear regression with parent-child stress. *Lack of memory* approached significance as a predictor of externalising and total toddler problem behaviours in regression models with parent-other but not parent-child stress. *Derogation of mother* was a significant predictor of mother reported externalising problem behaviours in their two year old infants in regression models with either parent-other or parent-child stress. *Derogation of mother* also predicted total problem behaviours in the regression model with parent-other stress.

Maternal attachment anxiety was a negative predictor of toddler internalising, externalising and total problem behaviours. Prediction reached significance for internalising and total problem behaviours in the parent-other but not parent-child stress regression models. Maternal attachment anxiety was parsed into the constituent AAI state of mind preoccupied scales of *Involving anger with mother* and *father* and *Passivity of discourse* and the direct effects of individual scales investigated. *Passivity of discourse* was unrelated to mother reported toddler internalising, externalising or total

problem behaviours in both the parent-other and parent-child stress regression models. *Involving anger with mother* was a negative predictor of mother reported externalising problem behaviours in both parent-other and parent-child stress regression models. *Involving anger with mother* was also a negative predictor of total problems in the parent-other stress regression model. The relationship between *Involving anger with mother* and internalising problem behaviours was also negative, although this did not reach significance. *Involving anger with father* was a negative predictor of mother reported toddler internalising problem behaviours in the parent-child and parent-other stress regression models. The prediction of total toddler problem behaviours from *Involving anger with father* approached significance in the parent-child stress model.

7.4 Discussion

7.4.1 Participant characteristics

This chapter utilised data collected from participants at all three stages of the study when the infants were aged 4, 12 and 24 months. As described in chapter six, the sample of mothers and infants who participated in all three stages of the study represented a low risk, middle class Australian population of mostly first time mothers.

7.4.2 Social emotional difficulty and toddler internalising, externalising and total problem behaviours

On average, infants had low social emotional difficulty. Mothers rated less than 15% of their 4 month old infants with social emotional difficulty above the cut-off. Average social emotional difficulty scores were consistent with prior low risk studies (Squires, Bricker & Twombly, 2004; Vissenberg, 2010). Salmonsson and Sleed (2010) reported an average social emotional difficulty score of around 40, close to the borderline, in their small cross sectional sample of help seeking Swedish mothers. The higher average social emotional difficulty scores in the Swedish study compared with this study is consistent with the higher risk sample.

Similarly, both mothers and fathers in the current study reported low average levels, below the 50th percentile, of internalising, externalising and total problem behaviours in their two year old toddlers. Mothers and fathers did not differ on their levels of toddler internalising problem behaviours, however, mothers reported significantly higher levels of externalising problem behaviours than fathers. Levels of toddlers with borderline clinical levels of internalising, externalising and total problem behaviours were 2%, 10% and 6% respectively. These levels were consistent with prior research demonstrating 2% of infants and toddlers show clinical level internalising and externalising problem behaviours and around 7% of infants and toddlers display borderline clinical symptoms (Achenbach & Rescorla, 2000). Levels of problem behaviours in this study were in accordance with prior research involving low risk populations of toddlers (Achenbach & Rescorla, 2000; Bayer, Hiscock, Ukoumunne, Price & Wake, 2008; Mathieson & Sanson, 2000; Van Zeijl et al., 2006). Average levels of toddler internalising ($\overline{X}$=4.88, $\overline{SD}$=3.84) and externalising problem behaviours in this study were also comparable to those of a similar Australian population based sample of 654 two year olds ($\overline{X}_{female}$ =12.1, $\overline{X}_{male}$ =12.8 and $\overline{X}$=6.3$_{female}$, $\overline{X}_{male}$ =6.5, respectively; Bayer et al.).

7.4.3 Associations amongst predictors and toddler internalising, externalising and total problem behaviours

Measures of maternal depression, difficult temperament and social emotional difficulty at 4 months were strongly associated with both parent-other and parent-child stress at 24 months. Both positive and negative marital relations were more strongly associated with parent-other than parent-child stress, although relations were only small and trivial respectively. This was consistent with marital relations affecting the mother's relationship with her spouse rather than her child. As expected, positive and negative marital relations were negatively and positively associated respectively with parenting stress.

Maternal attachment avoidance was negatively associated with both parent-other and parent-child stress. This was consistent with the expectation that mothers who use avoidant attachment strategies would be less likely to report parenting stress. Maternal attachment anxiety had small to trivial positive associations with parent-child and parent-other stress. This was consistent with the expectation that mothers who use anxious attachment strategies would be more likely to report parenting stress. Both maternal attachment avoidance and anxiety had stronger associations with parent-other than with parent-child stress. Perhaps parent-other stress is relatively more related to aspects of the mother whereas parent-child stress is more related to the mother's perception of aspects of their child.

There were small positive associations between infant attachment anxiety at 12 months and both parent-other and parent-child stress at 24 months. Note that the strength of association between infant attachment anxiety and concurrent parenting stress at 12 months reported in chapter six was trivial. Thus it may be that the effects of infant attachment anxiety on parenting stress unfold over time. The associations between infant attachment avoidance at 12 months and parent-other and parent-child stress at 24 months were trivial and negative. Note that the strength of association between infant attachment avoidance and concurrent parenting stress at 12 months reported in chapter six was negative and small. Thus whereas concurrent infant attachment avoidance was negatively associated with concurrent parenting stress, it had little relation with subsequent parenting stress one year later.

Associations with toddler internalising, externalising and total problem behaviours were moderate to strong for maternal depression, infant difficult temperament and social emotional difficulty at 4 months, and concurrent parent-other and parent-child stress at 24 months. Maternal depression was more strongly associated with toddler internalising than externalising problem behaviours, perhaps reflective of a genetic predisposition. Difficult temperament and social emotional difficulty had similar

relations with both toddler internalising and externalising problem behaviours. Parent-child stress had slightly higher associations with toddler problem behaviours than parent-other stress.

Apart from the moderate association between infant attachment avoidance and toddler internalising problem behaviours, positive and negative marital relations and maternal and infant attachment anxiety and avoidance had small to trivial associations with toddler problem behaviours. Associations were generally higher with toddler internalising and total than externalising problem behaviours. There were negative associations with positive marital relations and maternal and infant attachment anxiety and toddler problem behaviours. It had been expected that maternal and infant attachment anxiety would be positively and not negatively associated with toddler problem behaviours.

Perhaps in a low risk population maternal attachment anxiety reflects greater sensitivity and emotional awareness of the mother to her child resulting in lower levels of problem behaviours. Alternatively it may be that mothers with elevated attachment anxiety are less likely to perceive or report their infant's behaviours as problematic. Negative associations between maternal attachment anxiety and father reported toddler problem behaviours however provided support for the former explanation. Thus maternal attachment anxiety in low risk populations appears to be a protective factor for toddler problem behaviours. Conversely there were positive associations between negative marital relations and maternal and infant attachment avoidance and toddler problem behaviours. These were in the expected direction.

Infant attachment avoidance was positively, and infant attachment anxiety negatively associated with both mother and father reported toddler internalising problem behaviours. One year old infants who avoided their mothers when distressed or scared due to being separated from their mother, were seen to have elevated levels

of internalising problem behaviours one year later. Thus infant attachment avoidance may provide an early marker for internalising problems such as depression and anxiety, due to genetic predisposition or arising from extremely avoidant parenting. In contrast, parents of infants who displayed resistant behaviour, characterised by approach and anger in the Strange Situation at 12 months, did not rate elevated levels of internalising problem behaviours one year later. These infants indicated they did not engage in characteristic internalising behaviour of keeping their wants and hurts to themselves and this persisted into toddlerhood.

Infant attachment anxiety and avoidance only had trivial relations with toddler externalising problem behaviours. Relations were in reverse directions for maternal versus paternal reports. Infant attachment avoidance was positively associated with maternal reported and negatively with father reported toddler externalising problem behaviours. In contrast, infant attachment anxiety was negatively associated with maternal reported and positively with father reported toddler internalising problem behaviours. Thus, contrary to expectation, infant strategies of avoidance of, or angry approach towards, their mother when distressed or scared due to being separated from their mother do not seem to be important in the development of toddler externalising problem behaviours. Perhaps externalising problem behaviours arise from regulation difficulties arising from different emotions such as frustration or anger resulting from having conflicting goals with their parents.

7.4.4 Predicting toddler internalising, externalising and total problem behaviours

7.4.4.1 Direct effects of maternal, infant and relationship predictors

The four predictors measured when infants were 4 months old that explained the most variance in toddler internalising (>20%), externalising (>18%) and total (>30%), problem behaviours were, in order, social emotional difficulty, maternal depression, parent-other stress and infant difficult temperament. With the exception of difficult temperament, all other 4 month predictors explained more variance in internalising and

total than externalising problem behaviours. Difficult temperament explained the same amount of variance, 21%, in internalising and externalising problem behaviours. Maternal depression was the second highest predictor of internalising and total problem behaviours, whilst being only the fourth highest predictor of externalising problem behaviours, with difficult temperament the second highest. Thus maternal depression was linked to toddler internalising problem behaviours in particular and difficult temperament explained relatively more variance in externalising problem behaviours than the other predictors. With the exception of maternal depression and difficult temperament, all other predictors were ranked similarly regardless of the type of problem behaviour.

The large effect of early maternal depression on toddler internalising and total problem behaviours found in this study was consistent with the extensive body of existing knowledge (Bagner, Pettit, Lewinsohn & Seeley, 2010; Gartstein & Sheeber, 2004; Meadows, McLanahan & Brooks-Gunn, 2007; Trapolini, McMahon & Ungerer, 2007). The hypothesis that infants may respond to maternal depression by demanding attention using externalising problem behaviours was supported. Although depression accounted for substantially more variance in internalising than externalising problem behaviours, 38% versus 18%, it was still the fourth highest predictor of and had a moderate effect on toddler externalising problem behaviours. Thus this study has demonstrated maternal depression in the first year is an important risk factor in the development of both toddler internalising and externalising problem behaviours.

Findings in this study were consistent with substantial prior research concerning the role of difficult temperament in the development of toddler internalising and externalising problem behaviours (Belsky, 2005; Oland & Shaw, 2005; Pluess & Belsky, 2010; Sanson, Hemphill & Smart, 2004; van Zeijl et al., 2006). This study found early infant difficult temperament explained similar amounts of variance in both toddler internalising and externalising problem behaviours. Early difficult temperament and

concurrent parent-other stress explained similar amounts of variance in toddler internalising and externalising problem behaviours. Concurrent parent-child stress however explained more variance in toddler problem behaviours than difficult temperament when entered simultaneously in the regression equation in contrast to findings reported by van Zeijl et al. (2006). Different stress measures, daily hassles versus parenting stress used in this study, may account for the difference in findings.

Contrary to a widely held belief, positive marital relations at 4 months was not a significant protective factor against internalising, externalising or total problem behaviours (Zeanah, 2009). Similarly, negative marital relations was not found to be an important predictor of toddler problem behaviours. This was contrary to the findings of several researchers (Cowan, Cowan & Mehta, 2009; Crockenberg, Leerkes & Lekka, 2007; van Zeijl et al., 2006). However these studies have utilised a variety of measures to represent negative marital relations including observational measures of negative emotions, reports of marital aggression and family problems. Marital relations in this study were assessed by maternal report on the Relationship Questionnaire (Braiker & Kelley, 1979). It may be that more extreme negative relations, captured by observational measures or measures designed to assess problems directly rather than relationship tone, have a stronger relationship with toddler problem behaviours.

Note also that this study investigated the longitudinal effect of early negative marital relations, when the infant was 4 months old, on subsequent toddler problem behaviours over one and a half years later. van Zeijl et al. (2006) reported a significant concurrent association ($r=.18$, $p<.01$) between negative marital relations and toddler externalising problem behaviours in a large low risk sample of 720 two year olds. In this study concurrent associations at 24 months were $r=.26$ and $r=.14$ for internalising and externalising problem behaviours respectively in a sample size of 47. Thus findings in this study are in accordance with van Zeijl et al.. Contrary to expectation, there were no direct or moderated effects of negative marital relations in either the parent-other or

parent-child stress regression models on the prediction of mother reported toddler internalising, externalising or total problem behaviours. On average negative marital relations in this study were low. It was possible the lack of expected relations is the result of a floor effect. Perhaps in a low risk sample negative marital relations are not sufficiently high to impact toddler behaviour.

Somewhat surprisingly, parent-child stress explained the least amount of variance in toddler internalising, 17%, externalising, 9%, and total, 21%, problem behaviours aside from positive and negative marital relations. Parent-child stress was a particularly poor predictor of toddler externalising problem behaviours. Perhaps externalising problem behaviours have more to do with specific episodes of behaviour arising from a lack of shared goals and parental discipline strategies that are unrelated to parent perceived stress arising from within the parent-child relationship as assessed by the PSI. Internalising problem behaviours on the other hand were strongly predicted by constructs that can be expected to have a large genetic component such as maternal depression, difficult temperament and social emotional difficulty.

7.4.4.2 Mediation of direct effects on toddler problem behaviours by parent-other and parent-child stress

Both concurrent parent-child and parent-other stress had moderate to large effects on toddler internalising, externalising and total problem behaviours. Thus this study supported the importance of parenting stress in the development of toddler problem behaviours consistent with prior infant research in low and high risk populations (Bayer, Hiscock, Ukoumunne, Price & Wake, 2008; Deater-Deckard, 2004; Mathieson & Sanson, 2000; van Zeijl et al., 2006; Williford, Calkins & Keane, 2007; Yates, Obradovic & Egeland, 2007). Life event stress however did not predict toddler problem behaviours. Thus the normal life event stresses associated in low risk populations associated with starting a family, such as loss of income, moving house, or changing jobs, were not found to affect the development of toddler problem behaviours.

It had been hypothesised that different sources of stress may have different effects on toddler problem behaviours (Costa, Weems, Pelerin & Dalton, 2006; Coyle, Roggman & Newland, 2002; Grant et al., 2003; McMahon, Grant, Compas, Thurm & Ey, 2003). Overall, parent-other stress explained more variance in internalising, externalising and total problem behaviours than parent-child stress. Thus this study found stress arising from a mother's relationships outside her relationship with her child had a greater effect on the development of toddler problem behaviours than stress arising from within the parent-child relationship. The difference in variance explained was greatest for externalising problem behaviours where parent-child stress explained just 9% of the variance compared with 20% by parent-other stress. The hypothesis that parent-child stress would be more strongly associated with internalising, than externalising problem behaviours was supported with 17% versus 9% variance explained respectively. However parent-other stress also explained more variance in internalising than externalising problem behaviours, 25% versus 20% respectively. Thus the hypothesis that parent-other stress was relatively more important for the development of toddler externalising than internalising problem behaviours was not supported.

It had also been hypothesised that different aspects of difficult temperament may have differential effects on toddler internalising versus externalising problem behaviours. This study found the difficult temperament dimension of *Unapproachability/ unadaptability* explained more variance in internalising than externalising problem behaviours in the parent-other stress regression models, 8% versus 2% respectively. The *Uncooperative/ unmanageable* dimension explained 16% of the variance in internalising versus 21% of the variance in externalising problem behaviours. The *Irritability* dimension explained 21% of the variance in internalising versus 16% of the variance in externalising problem behaviours. Results were similar in the parent-child regression models. Thus whereas early *Unapproachability/ inadaptability*, at 4 months, was more related to internalising problem behaviours, the

Uncooperative/unmanageable and *Irritable* dimensions were associated with both types of problem behaviours. Hence difficult temperament was found to be a generic predictor of toddler internalising and externalising problem behaviours.

There was no observed effect of maternal attachment avoidance measured at 4 months on either toddler internalising, externalising or total problem behaviours. This was contrary to prior research that had supported an association between maternal attachment avoidance and child externalising problem behaviours (Crowell, O'Connor, Wollmers, Sprafkin & Rao, 1991). Their research however was in a high risk population of behaviourally disturbed children aged 5 to 11 years old and involved associations with insecure dismissing classifications with externalising problem behaviours. There has been no prior research demonstrating an association between the maternal attachment avoidance dimension and toddler externalising problem behaviours.

The effects of the four maternal attachment avoidance factors derived in chapter five on toddler internalising, externalising and total problem behaviours were investigated. The individual AAI state of mind scales varied in their relations with toddler internalising, externalising and total problem behaviours. This was consistent with the conclusion of functional differences amongst the avoidant strategies of idealisation, lack of memory and derogation drawn in chapter six. Regression analyses in the current chapter demonstrated *Idealisaton of mother* and *father* had a negative relationship with toddler problem behaviours. In particular the effect of *Idealisation of mother* on internalising problem behaviours approached significance and explained 5% of the variance in the parent-child stress model. The higher a mother's AAI idealisation of her own mother the fewer internalising problems were reported in their two year old infants. This was consistent with idealising mothers restricting attention to avoid negative events and evaluations and thus reporting fewer problem behaviours in their toddlers. However fathers and mothers reported similar levels of their toddlers' internalising problem behaviours. Thus it seems reasonable to conclude that the

observed inverse relation between maternal attachment idealisation of her own mother and toddler internalising problem behaviours cannot be explained by reduced maternal reporting of problem behaviours but represents a functional relation. Together, these findings suggested maternal idealisation, particularly of what it means to be a mother, acted as a protective factor against the development of toddler internalising problem behaviours in a low risk population. The relation may represent genetic predisposition and /or effects of a rearing environment that presumably does not involve giving attention to negative emotions and experiences.

Conversely, maternal attachment avoidance factors of AAI *Lack of memory* and *Derogation of mother* had positive relationships with toddler internalising, externalising and total problem behaviours. AAI *Lack of memory* explained 5% and 4% of the variance in externalising and total problem behaviours respectively in the parent-other regression models. *Derogation of mother* explained around 6% and 5% of the variance in toddler externalising and total problem behaviours respectively. The active negative, contemptuous approach shown by derogating mothers may put their infants at greater risk for developing problem behaviours due to an overtly negative rearing environment. Alternatively, it may be that a mother's derogating state of mind with respect to her own mother influences her interpretation of her infant's behaviour as being problematic. There is some support for both explanations given the higher association with mother reported than father reported externalising problem behaviours and AAI *Derogation of mother* (r=.26 and r=.19 respectively).

Thus this study has demonstrated a mother's avoidant state of mind with respect to her childhood relationship with her mother and not her father was influential in determining her toddler's externalising and total problem behaviours. *Derogation of mother* and *Lack of memory* were associated with externalising and total problem behaviours, and *Idealisation of mother* negatively with internalising problem behaviours. Thus different aspects of maternal attachment avoidance were shown to

have differential effects with respect to toddler internalising, externalising and total problem behaviours. Replication in a larger sample would be most informative.

Maternal attachment anxiety was hypothesised to have a positive direct effect on toddler internalising problem behaviours. Contrary to expectation maternal attachment anxiety had a small non-significant negative effect on toddler internalising problem behaviours explaining 3% of the variance. This was in contrast to prior research which has provided some support for a positive association between maternal attachment anxiety and internalising problem behaviours in preschoolers and older children (Cassidy & Berlin, 1994; Costa & Weems, 2005; Cowan, Cohn, Cowan & Pearson, 1996; Dozier, Stivall & Albus, 1999; Meadows, McLanahan & Brooks-Gunn, 2007; Shamir-Essakow, Ungerer & Rapee, 2007). However there has been very little research involving infants. This study has demonstrated a small negative effect of a continuous dimension of maternal attachment anxiety on maternal reported toddler problem behaviours, particularly internalising problem behaviours, in a low risk population.

Individual effects of the three maternal attachment anxiety AAI states of mind scales on toddler internalising, externalising and total problem behaviours varied. *Passivity of discourse* was unrelated to toddler problem behaviours. AAI *Involving anger with mother* and *father* were negative predictors of mother reported toddler internalising, externalising and total problem behaviours. *Involving anger with mother* explained 13% and 7% of the variance in externalising and total toddler problem behaviours respectively. *Involving anger with father* explained 10% of the variance in both toddler internalising and total problem behaviours. Thus AAI *Involving anger with mother* protected against externalising problem behaviours whereas AAI *Involving anger with father* had a protective effect on internalising problem behaviours. Perhaps in a low risk sample, AAI involving anger is an indication of mothers' emotional expressiveness which has been shown to be important in children's developing social and emotional skills (Caspi et al., 2004; Gravener et al., 2011). Thus in this study,

expressing involving anger in the Adult Attachment Interview was a protective factor reducing mother reported internalising, externalising and total problem behaviours in their two year old toddlers.

This was contrary to prior research in a small, low risk sample (N=27) however which found maternal involving anger at either parent, was directly related to both concurrent internalising and externalising problem behaviours in the classroom in kindergarten and early school aged children (Cowan, Cohn, Cowan & Pearson, 1996). Pearson correlations in the current study between both AAI *Involving anger with mother* and *father* and mother reported toddler internalising, externalising and total problem behaviours were negative. In the Cowan et al. study, *Involving anger with mother* and *father* were positively associated with externalising and negatively associated with internalising problem behaviours. Behaviour problems were assessed in the classroom by teacher report on an adapted Child Adaptive Behaviour Inventory (Schaefer & Hunter, 1983), designed to assess a child's adaptation to school however and not the CBCL. Although the two measures were correlated, it is possible this study's contrasting results are due to a combination of study differences including outcome measures with different emphasis, concurrent versus longitudinal assessment of attachment and problem behaviours, parents versus teachers as informants, home versus school context, and toddlers versus kindergarteners.

Infant attachment avoidance was found to be a risk factor for mother reported internalising and total but not externalising problem behaviours explaining 11% and 4% of the variance respectively. This was contrary to the differential outcome hypothesis which had predicted a direct effect of infant attachment avoidance on externalising problem behaviours (Burgess, Marshall, Rubin & Fox, 2003; Pierrehumbert, Miljkovitch, Planherel, Halfon & Ansermet, 2000; Weinfeld, Sroufe, Egeland & Carlson, 2008). Note that the effect size of infant attachment avoidance on internalising problem behaviours was larger than the effect of infant attachment insecurity on total problem behaviours

reported in meta–analyses of less than 10% (Schneider, Atkinson & Tardiff, 2001; van Ijzendoorn, Verijken, Bakermans-Kranenburg & Riksen-Walraven, 2004).

Infants who show avoidant behaviours in the Strange Situation have already developed the habit of keeping their hurts and needs to themselves, characteristic of internalising problem behaviours, and not using their close relationships adaptively for support. Thus this study has provided support for a direct effect of infant attachment avoidance on the development of toddler internalising problem behaviours in a low risk population. This was in accordance with prior developmental theory and research in high risk populations with older children (Brumariu & Kerns, 2010; Cozolino, 2006; Dallaire & Weinraub, 2007; Pierrehumbert, Miljkovitch, Plancherel, Halfon & Ansermet, 2000; Wood, McLeod, Sigman, Hwang, & Chu, 2003). The effect of infant attachment avoidance at 12 months was demonstrated over and above the effect of concurrent parenting stress contrary to the presumption that attachment effects can be explained by continuity of risk (Thompson, 2008; Weinfeld, Sroufe & Egeland, 2000).

Contrary to expectation, infant attachment anxiety, represented by Strange Situation resistant behaviour by the infants when they were 12 months old, was negatively associated with problem behaviours, particularly internalising problem behaviours, when they were two years old. The negative effect of infant attachment anxiety explained 7% and 11% of the variance in mother reported toddler internalising problem behaviours in the parent-child and parent-other stress regression models respectively. Thus this study demonstrated Strange Situation resistance was a protective and not a risk factor in the development of toddler internalising problem behaviours. This was contrary to expectation from the attachment literature (Bogels & Brechman-Toussaint, 2006; Manassis, 2001; Mikulincer & Shaver, 2008).

Perhaps 12 month old infants who display resistance in the Strange Situation are expressing their emotions, albeit somewhat maladaptively, when under stress. Over the next twelve months these infants may learn to express their emotions and get their needs met more adaptively, therefore resulting in reduced problem behaviours. It makes sense that the negative relation was strongest with toddler internalising problem behaviours. Those infants who act against their mother to try and alleviate their distress are less likely to develop internalising problem behaviours characterised by avoidance of others and keeping hurts and needs to one self.

Parenting stress had been conceptualised as a key organising construct for the development of toddler problem behaviours. It provided a measure of the affective tone of the infant's rearing environment which has been shown to be important in social emotional development. Parenting stress also represented genetic stress reactivity and regulation predisposition. It was proposed that the effects of maternal, child and relationship factors on toddler problem behaviours may be mediated by parenting stress. Consistent with expectation, both parent-child and parent-other stress at 24 months at least partially mediated the direct effects of maternal depression, difficult temperament and social emotional difficulty assessed when the infants were 4 months old on toddler internalising, externalising and total problem behaviours. Due partly to the small to trivial direct effects of positive and negative marital relations, maternal and infant attachment anxiety and avoidance, no mediation effects were observed with these constructs. Given the small associations between parenting stress and maternal and infant attachment anxiety and avoidance however, it seems likely that there is little shared variance between attachment constructs and parenting stress.

7.4.4.3 Interaction effects on toddler problem behaviours

The effect of concurrent parent-other and parent-child stress on mother reported toddler externalising problem behaviours was moderated by social emotional difficulty and maternal depression when infants were 4 months old. The higher infants' early social emotional difficulty or mothers' depression, the less concurrent parenting stress

affected toddler externalising problem behaviours. Thus early social emotional difficulty and maternal depression may set infants on a pathway of elevated risk for externalising problem behaviours regardless of later parenting stress levels.

The interaction between AAI *Idealisation of mother* when the infants were 4 months old and infant attachment avoidance at 12 months explained 7% of the variance in externalising problem behaviours. Thus whereas these avoidant attachment risk factors alone did not have individual effects, the combination of attachment avoidance in both mother, represented by *Idealisation of mother*, and infant, affected the development of toddler externalising problem behaviours.

Cowan, Cohn, Cowan and Pearson (1996) reported significant buffering effects on both internalising and externalising problem behaviours by positive marital relations in their small, low risk sample of kindergarten children. In the current study, the interaction between positive marital relations at 4 months and concurrent parent-other and parent-child stress predicted toddler externalising but not internalising problem behaviours. The more positive marital relations were early in infancy, the more concurrent parenting stress affected toddler externalising problem behaviours. Perhaps infants who experienced a more positive emotional rearing environment were more sensitive to and less able to cope with a more stressful rearing environment later on.

Thus toddler externalising problem behaviours were particularly affected by early social emotional difficulty and maternal depression regardless of parenting stress levels. This reflected the importance of early social emotional difficulty and maternal depression in the development of toddler problem behaviours. The combination of maternal idealisation of her mother with infant attachment avoidance had a stronger effect on toddler externalising problem behaviours than either of these constructs alone. Early positive marital relations was associated with greater effects of concurrent parenting stress on toddler externalising problem behaviours.

Positive interactions between difficult temperament in 4 month old infants and infant attachment avoidance at 12 months with parent-other or parent-child stress at 24 months predicted toddler internalising problem behaviours. Thus the more difficult mothers reported their infant's early temperament, the more concurrent parenting stress affected toddler internalising problem behaviours. This was consistent with earlier research demonstrating differential susceptibility of temperamentally difficult infants to rearing environment risk discussed in chapter two (Pluess & Belsky, 2010). The more difficult the infant's early temperament, the greater the effect of parenting stresson toddler internalising problem behaviours. Note that findings of differential susceptibility to parenting stress by temperamentally difficult infants were demonstrated only for internalising problem behaviours and not for externalising problem behaviours. Thus the impact of parenting stress on the development of toddler externalising problem behaviours did not depend upon how difficult the infant's temperament was.

Similarly the effect of parenting stress on toddler internalising problem behaviours at 24 months increased with increased infant attachment avoidance at 12 months. Chapter six demonstrated infant attachment avoidance was negatively associated with concurrent parenting stress at 12 months. At 24 months this relation was negligible although still in the negative direction. Thus there was essentially no direct relation between infant attachment avoidance at 12 months and parenting stress at 24 months. Results indicated however that the higher her infant's attachment avoidance at 12 months the greater the effect of parenting stress on concurrent toddler internalising problem behaviours. Thus avoidant infants were shown to be difficerntially susceptible to the effects of parenting stress on toddler internalising problem behaviours.

The protective effect of mothers having an angry state of mind with respect to their own fathers in the AAI on toddler internalising problem behaviours was moderated by concurrent parenting stress. The higher a mother's concurrent parent-other or parent-child stress, the less AAI expressed anger at her father was related to toddler internalising problem behaviours. Concurrent parenting stress attenuated the protective effects of both early positive marital relations and a mother's expressed involving anger with her father, on toddler internalising problem behaviours.

7.4.4.4Implications of mediation by and moderation of parenting stress

This chapter has presented results supporting partial mediation of the effects of earlier risk factors in infancy on toddler internalising and externalising problem behaviours by concurrent parenting stress. Mediated risk factors included maternal depression, difficult temperament and socioemotional difficulty assessed at 4 months. Partial mediation indicated some but not all of the effects of early risk can be explained by current rearing environment risk represented by a mother's parenting stress. Importantly findings indicated the effects of risk factors present in infancy from as early as 4 months of age remained influential nearly two years later in addition to concurrent risk in accounting for toddler problem behaviours.

Findings indicated variation in differential susceptibility to the effects of concurrent parenting stress on toddler internalising versus externalising problem behaviours. Early difficult temperament and infant attachment avoidance amplified effects of parenting stress on toddler internalising problem behaviours. Early maternal depression and infant socioemotional difficulty attenuated the effects of parenting stress on toddler externalising problem behaviours. Thus key developmental variables of temperament, maternal depression, attachment and socioemotional difficulty impacted the effects of parenting stress on toddler internalising versus externalising problem behaviours in different ways. This was an important finding given most infant research

has either considered total problem behaviours or externalising problem behaviours but rarely both internalising and externalising problem behaviours in the same study.

Thus findings supported enduring feed forward effects of early risk and interactions amongst important developmental constructs in explaining toddler internalising and externalising problem behaviours. Parenting stress was shown to be an important factor in the development of toddler problem behaviours along with maternal depression, difficult temperament and infant socioemotional difficulty. Interactions are likely to be much more extensive and complex than the simplistic two way interactions tested in this chapter. Indeed there are likely to be many other possible conceptualisations involving these key constructs. Nonetheless the analyses presented in this chapter illustrated some of the determinants of infants' differential susceptibility to rearing environment risk that may emerge down the track as problem behaviours. Person-centred analyses presented in chapter eight extend these findings by investigating differences in levels of toddler problem behaviours across levels of risk present in the community sample.

7.4.4.5 Covariation of internalising and externalising problem behaviours

Shared variance between internalising and externalising problem behaviours has been explained as being due both to shared method variance and substantive overlap between the constructs with the possibility that problem behaviours in one domain may contribute to the development of problem behaviours in the other (Angold & Costello, 1992; Lilienfeld, 2003). Covariation could also be due to shared underlying casual factors. In the current study, concurrent toddler internalising problem behaviours explained around one fifth of the variance in toddler externalising problem behaviours and vice versa. This was consistent with the generally large covariation reported between internalising and externalising problem behaviours in older children (Gilliom & Shaw, 2004; Oland & Shaw, 2003; Lilienfeld; McConaughy & Achenbach, 1994). However parent-child stress explained more variance in internalising and externalising problem behaviours than their covariation.

Further this study demonstrated negative interaction effects between internalising problem behaviours and either parent-other or parent-child stress on concurrent externalising and total problem behaviours. The higher the level of internalising problem behaviours, the less parent-other or parent-child stress affected externalising problem behaviours. The decreased role of the rearing environment with increased internalising problem behaviours provided support for a constitutional basis to covarying internalising and externalising problem behaviours.

7.4.5 Limitations

In addition to general construct measurement limitations discussed in the previous chapter, there were limitations to the regression analyses conducted in this study. These largely stemmed from the significantly smaller sample size at 24 months which was reduced by more than half from the 12 month stage of the study, from 117 to 47 participants. Reduced statistical power resulted from this low sample size. This limited the number of variables that could be studied simultaneously. A large number of regression analyses were necessary to investigate the hypothesised effects of key constructs across infancy on the development of toddler internalising and externalising problem behaviours. Separate regression analyses reduced the capacity to infer relative effects of different constructs on toddler problem behaviours.

Table 7.3

Linear regressions of direct, mediated and moderated effects of maternal anxiety and avoidance, maternal depression, negative and positive marital relations and difficult temperament at 4 months and infant attachment anxiety and avoidance at 12 months by parent-other and parent-child stress at 24 months on concurrent mother reported toddler internalising and externalising problem behaviours

		Internalising						Externalising						Total					
Step	**Model**	**R^2 Δ**	**B**	**SE**	**Beta**	**sr^2**	**f^2**	**R^2 Δ**	**B**	**SE**	**Beta**	**sr^2**	**f^2**	**R^2 Δ**	**B**	**SE**	**Beta**	**sr^2**	**f^2**
1	Positive marital rels	.00	-.16	.60	-.04	.00	.00	.01	.44	.97	.07	.01	.01	.00	-.44	2.18	-.03	.00	.00
2	Parent-other stress	.21**	.06	.02	.46**	.21	.27	.18**	.09	.03	.42**	.18	.22	.33**	.27	.06	.58**	.33	.49
	Positive marital rels		.10	.54	.03	.00	.00		.82	.90	.13	.02	.02		.74	1.83	.05	.00	.00
3	Parent-other stress	.02	.06	.02	.44**	.21	.27	.06^	.10	.03	.46**	.21	.27	.01	.28	.06	,59**	.34	.52
	Positive marital rels		-.16	.59	-.04	.00	.00		1.49	.95	.24	.06	.06		1.26	1.20	.09	.01	.01
	stress by pos mr		-.04	.03	-.17	.03	.03		.09	.05	.27	.08	.09		.07	.11	.09	.01	.01
1	Negative marital rels	.00	.02	.62	.00	.00	.00	.00	-.36	1.01	-.06	.00	.00	.00	.33	2.26	.02	.00	.00
2	Parent-other stress	.22**	.06	.02	.47**	.22	.28	.18**	.09	.03	.43**	.18	.22	.33**	.28	.06	.59**	.33	.49
	Negative marital rels		-.31	.56	-.08	-.01	-.01		-.84	.94	-.13	-.02	-.02		-1.13	1.90	-.08	-.01	.01
3	Parent-other stress	.05	.07	.02	.50**	.25	.33	.00	.09	.03	.43**	.18	.22	.02	.28	.06	.60**	0.28	.39
	Negative marital rels		-.48	.56	-.12	-.02	-.02		-.83	.97	-.13	-.02	-.02		-1.45	1.93	-.10	.35	.54
	stress by neg mr		-.04	.03	-.23	-.06	-.06		.00	.04	.00	.00	.00		-.08	.09	-.13	-.02	.02
1	Maternal depression	.35**	2.25	.48	.59**	.35	.54	.15**	2.38	.88	.38**	.15	.18	.33**	8.03	1.77	.57**	.33	.49
2	Parent-other stress	.02	.02	.02	.16	.03	.03	.05	.06	.04	.28	.06	.06	.08*	.17	.07	.36*	.12	.14
	Maternal depression		1.85	.62	.48**	.18	.22		1.28	1.12	.21	.03	.03		4.81	2.17	.34*	.11	.12
3	Parent-other stress	.00	.02	.02	.17	.03	.03	.11*	.07	.04	.31^	.06	.06	.05	.18	.07	.39*	.14	.16
	Maternal depression		1.90	.76	.50*	.14	.16		3.09	1.28	.50*	.10	.11		7.64	2.54	.55**	.18	.22
	stress by mat dep		.00	.02	-.02	.00	.00		-.09	.04	-.46*	.11	.12		-.14	.07	-.32^	.10	.11

		Internalising						Externalising						Total					
Step	**Model**	**R^2 Δ**	**B**	**SE**	**Beta**	**sr^2**	**f^2**	**R^2 Δ**	**B**	**SE**	**Beta**	**sr^2**	**f^2**	**R^2 Δ**	**B**	**SE**	**Beta**	**sr^2**	**f^2**
1	Difficult temperament	.20**	1.76	.54	.45**	.20	.25	.18**	2.69	.88	.43**	.18	.22	.28**	7.56	1.87	.53**	.28	.39
2	Parent-other stress	.08*	.04	.02	.33*	.10	.11	.05	.06	.03	.27	.07	.08	.14**	.20	.07	.43**	.19	.23
	Difficult temperament	.10*	1.14	.59	.29^	.08	.09		1.86	.99	.29	.08	.09		4.62	1.95	.32*	.12	.14
3	Parent-other stress		.03	.02	.25^	.07	.08	.00	.05	.03	.26	.06	.06	.03	.18	.07	.38**	.16	.19
	Difficult temperament		1.30	.56	.33*	.12	.14		1.90	1.00	.30	.08	.09		4.91	1.94	.34*	.14	.16
	stress by dif temp		.04	.02	.32*	.14	.16		.01	.03	.06	.00	.00		.18	.06	.16	.04	.04
1	Unapproachable	.07^	1.00	.58	.26^	.07	.08	.02	.91	.96	.14	.02	.02	.06	3.34	2.13	.24	.06	.06
2	Parent-other stress	.18**	.06	.02	.43**	.18	.22	.15**	.08	.03	.40**	.15	.18	.29**	.27	.06	.56**	.29	.41
	Unapproachable		.58	.55	.15	.02	.02		.27	.92	.04	.00	.00		1.35	1.85	.10	.01	.01
3	Parent-other stress	.04	.05	.02	.40**	.14	.16	.00	.08	.03	.40**	.15	.00	.02	.25	.06	.53**	.26	.35
	Unapproachable		.60	.54	.15	.02	.02		.28	.93	.04	.00	.00		1.39	1.85	.10	.01	.01
	stress by unapp		.03	.02	.21	.04	.04		.01	.03	.04	.00	.00		.07	.06	.15	.02	.02
1	Uncooperative	.14*	1.46	.56	.37*	.14	.16	.21**	2.92	.87	.46**	.21	.27	.27**	7.46	1.89	.52**	.27	.37
2	Parent-other stress	.11*	.05	.02	.38*	.11	.12	.05^	.05	.03	.26^	.05	.05	.15**	.21	.06	.43**	.15	.18
	Uncooperative		.78	.60	.20	.03	.03		2.17	.96	.34*	.10	.11		4.62	1.92	.32*	.08	.09
3	Parent-other stress	.07^	.04	.02	.32*	.08	.09	.00	.05	.03	.26^	.05	.11	.02	.19	.06	.41**	.13	.15
	Uncooperative		.99	.58	.25^	.05	.05		2.24	.98	.35*	.10	.00		4.99	1.95	.35*	.09	.10
	stress by uncoop		.04	.02	.27*	.07	.08		.01	.03	.06	.00	.00		.07	.07	.13	.02	.02
1	Irritable	.17**	1.55	.54	.41**	.17	.20	.16**	2.45	.87	.40**	.16	.19	.23**	6.67	1.89	.48**	.23	.30
2	Parent-other stress	.11*	.05	.02	.36*	.11	.12	.07^	.06	.03	.30^	.07	.08	.18**	.22	.06	.46**	.18	.22
	Irritable		.96	.56	.25^	.05	.05		1.67	.93	.27^	.06	.06		3.94	1.86	.28*	.07	.08
3	Parent-other stress	.07*	.04	.02	.32*	.08	.09	.00	.06	.03	.30^	.07	.06	.01	.21	.06	.45**	.16	.19
	Irritable		.93	.54	.24^	.05	.05		1.67	.95	.27^	.06	.00		3.89	1.87	.28*	.06	.06
	stress by irritable		.04	.02	.27*	.07	.08		.01	.03	.02	.00	.00		.06	.07	.10	.01	.01

		Internalising						Externalising						Total					
Step	**Model**	**R^2 Δ**	**B**	**SE**	**Beta**	**sr^2**	**f^2**	**R^2 Δ**	**B**	**SE**	**Beta**	**sr^2**	**f^2**	**R^2 Δ**	**B**	**SE**	**Beta**	**sr^2**	**f^2**
1	social emotional dif	.45**	2.52	.43	.67**	.45	.82	.26**	3.11	.81	.51**	.26	.35	.50**	9.75	1.51	.71**	.50	.00
2	Parent-other stress	.03	.03	.02	.20	.05	.05	.04	.05	.03	.22	.05	.05	.08**	.15	.06	.32**	.16	.19
	social emotional dif		2.17	.48	.58**	.33	.49		2.46	.91	.40*	.15	.18		7.67	1.60	.56**	.36	.56
3	Parent-other stress	.03	.03	.02	.21	.06	.06	.04	.04	.03	.20	.04	.04	.01	.14	.06	.30*	.15	.18
	social emotional dif		2.04	.52	.54**	.28	.39		2.95	.95	.48**	.19	.23		8.28	1.70	.60**	.37	.59
	stress by soc emot dif		.01	.01	.09	.01	.01		-.04	.03	-.21	.05	.05		-.05	.05	-.12	.03	.03
1	Mat Attach Avoid	.00	.04	.23	.03	.00	.00	.00	.16	.37	.07	.00	.00	.00	.01	.84	.00	.00	.00
2	Parent-other stress	.27**	.07	.02	.55**	.27	.37	.22**	.11	.03	.50**	.25	.33	.39	.32	.06	.67	.39	.64
	Mat Attach Avoid		.34	.22	.23	.06	.06		.60	.36	.25^	.07	.08		1.36	.72	.25^	.08	.09
3	Parent-other stress	.02	.08	.02	.58**	.29	.41	.00	.11	.03	.51**	.22	.28	.02	.33	.06	.70	.41	.69
	Mat Attach Avoid		.40	.22	.27^	.08	.09		.61	.37	.25	.06	.06		1.54	.73	.28*	.10	.11
	stress by mat attach av		.01	.01	.16	.03	.03		.00	.01	.01	.00	.00		.02	.02	.14	.03	.03
1	Dismissing SOM-IdF	.01	-.27	.40	-.11	.01	.01	.04	-.81	.63	-.19	.04	.04	.03	-1.59	1.43	-.17	.03	.03
2	Parent-other stress	.21**	.06	.02	.47**	.21	.27	.14*	.08	.03	.39*	.14	.16	.31**	.27	.06	.58**	.31	.45
	Dismissing SOM-IdF		.03	.37	.01	.00	.00		-.41	.61	-.10	.01	.01		-.24	1.24	-.03	.00	.00
3	Parent-other stress	.02	.07	.02	.52**	.22	.28	.05	.10	.03	.48**	.19	.23	.05	.32	.07	.67**	.36	.56
	Dismissing SOM-Id-F		.24	.43	.09	.01	.01		.22	.70	.05	.00	.00		1.09	1.43	.12	.01	.01
	stress by IdF		.01	.02	.15	.02	.02		.04	.02	.28	.05	.05		.09	.05	.26	.05	.05
1	Dismissing SOM-IdM	.05	-.61	.40	-.23	.05	.05	.00	.03	.66	.01	.00	.00	.02	-1.33	1.48	-.14	.02	.02
2	Parent-other stress	.18	.06	.02	.44**	.18	.22	.19	.09	.03	.45**	.19	.23	.32**	.28	.06	.59**	.32	.47
	Dismissing SOM-IdM		-.31	.38	-.12	.01	.01		.54	.63	.13	.01	.01		.16	1.28	.02	.00	.00
3	Parent-other stress	.00	.06	.02	.46**	.18	.22	.00	.10	.03	.46**	.19	.23	.01	.29	.07	.60**	.32	.47
	Dismissing SOM-IdM		-.24	.41	-.09	.01	.01		.62	.68	.15	.01	.01		.44	1.38	.05	.00	.00
	stress by IdM		.01	.01	.01	.01	.01		.01	.02	.05	.00	.00		.03	.05	.08	.01	.01

		Internalising						Externalising						Total					
Step	**Model**	**R^2 Δ**	**B**	**SE**	**Beta**	**sr^2**	**f^2**	**R^2 Δ**	**B**	**SE**	**Beta**	**sr^2**	**f^2**	**R^2 Δ**	**B**	**SE**	**Beta**	**sr^2**	**f^2**
1	Dismissing SOM-LM	.00	.01	.33	.00	.00	.00	.00	.21	.53	.06	.00	.00	.00	-.03	1.21	.00	.00	.00
2	Parent-other stress	.25**	.07	.02	.53**	.25	.33	.21	.10	.03	.49**	.21	.27	.38	.31	.06	.66**	.38	.61
	Dismissing SOM-LM		.40	.31	.19	.03	.03		.80	.51	.23	.05	.05		1.73	1.02	.22^	.04	.04
3	Parent-other stress	.00	.07	.02	.50**	.15	.18	.00	.11	.04	.51**	.15	.18	.00	.33	.08	.69**	.28	.39
	Dismissing SOM-LM		.34	.37	.16	.02	.02		.86	.61	.25	.04	.04		1.98	1.22	.25	.04	.04
	stress by LM		.00	.01	-.05	.00	.00		.01	.02	.03	.00	.00		.02	.05	.06	.00	.00
1	Dismissing SOM-DerM	.02	.48	.57	.13	.02	.02	.07	1.54	.90	.25^	.07	.08	.04	2.88	2.07	.21	.04	.04
2	Parent-other stress	.22	.06	.02	.47**	.22	.28	.17	.09	.03	.41**	.17	.20	.34	.28	.06	.58**	.34	.52
	Dismissing SOM-DerM		.49	.51	.13	.02	.02		1.55	.83	.26^	.07	.08		2.90	1.68	.21^	.05	.05
3	Parent-other stress	.00	.06	.02	.47**	.22	.28	.02	.09	.03	.43**	.18	.22	.00	.28	.06	.58**	.34	.52
	Dismissing SOM-DerM		.44	.53	.12	.02	.02		1.77	.85	.29*	.08	.09		3.01	1.76	.22^	.05	.05
	stress by DerM		.01	.02	.06	.00	.00		-.03	.02	-.15	.02	.02		-.01	.05	-.03	.00	.00
1	Dismissing SOM-DerF	.00	-.19	.59	-.05	.00	.00	.00	-.14	.95	-.02	.00	.00	.01	-1.62	2.14	-.12	.01	.01
2	Parent-other stress	.22	.06	.02	.49**	.22	.28	.18	.09	.03	.43**	.18	.22	.33	.28	.06	.59**	.33	.49
	Dismissing SOM-DerF		.25	.54	.07	.00	.00		.50	.90	.08	.01	.01		.36	1.83	.03	.00	.00
3	Parent-other stress	.00	.06	.03	.43*	.08	.09	.00	.10	.05	.45*	.09	.10	.00	.28	.09	.59	.15	.18
	Dismissing SOM-DerF		-.55	2.43	-.15	.00	.00		.96	4.05	.16	.01	.01		.39	8.22	.03	.00	.00
	stress by DerF		-.03	.07	-.21	.00	.00		.01	.12	.07	.00	.00		.00	.25	.00	.00	.00
1	Mat attach anxiety	.03	-.29	.25	-.17	.03	.03	.01	-.22	.42	-.08	.01	.01	.01	-.58	.94	-.09	.01	.01
2	Parent-other stress	.30**	.07	.02	.57**	.30	.43	.21**	.10	.03	.48**	.21	.27	.41	.32	.06	.67**	.41	.69
	Mat attach anxiety		-.58	.22	-.35*	.11	.12		-.61	.39	-.23	.05	.05		-1.81	.76	-.30*	.08	.09
3	Parent-other stress	.08*	.10	.02	.73**	.38	.61	.00	.11	.04	.50**	.17	.20	.03	.36	.07	.77	.41	.69
	Mat attach anxiety		-.60	.21	-.36**	.12	.14		-.61	.40	-,23	.05	.05		-1.86	.76	-.31	.08	.09
	stress by mat att anx		-.01	.01	-.32*	.08	.09		.00	.01	-.04	.00	.00		-.03	.02	-.19	.03	.03

		Internalising						Externalising						Total					
Step	**Model**	**R^2 Δ**	**B**	**SE**	**Beta**	**sr^2**	**f^2**	**R^2 Δ**	**B**	**SE**	**Beta**	**sr^2**	**f^2**	**R^2 Δ**	**B**	**SE**	**Beta**	**sr^2**	**f^2**
1	Preocc. SOM-Ang-M	.01	-.20	.32	-.09	.01	.01	.06	-.83	.50	-.25	.06	.06	.01	-.86	1.17	-.11	.01	.01
2	Parent-other stress	.26**	.07	.02	.52**	.26	.35	.23	.10	.03	.50**	.23	.30	.39**	.31	.06	.64**	.39	.64
	Preocc. SOM-Ang-M		-.45	.29	-.22	.04	.04		-1.22	.45	-.36^	.13	.15		-2.00	.94	-.26*	.07	.08
3	Parent-other stress	.00	.07	.02	.52**	.24	.32	.00	.10	.03	.49**	.22	.28	.00	.31	.06	.64**	.37	.59
	Preocc. SOM-Ang-M		-.49	.30	-.22	.04	.04		-1.24	.48	-.37*	.12	.14		-1.98	.99	-.26^	.06	.06
	stress by AngM		.00	.01	.00	.00	.00		.00	.01	.02	.00	.00		.00	.03	-.01	.00	.00
1	Preocc. SOM-AngF	.06	-.63	.39	-.25	.06	.06	.03	-.73	.63	-.18	.03	.03	.06	-2.23	1.41	-.24	.06	.06
2	Parent-other stress	.25**	.07	.02	.50**	.25	.33	.19**	.09	.03	.44**	.19	.23	.37**	.29	.06	.62**	.38	.61
	Preocc. SOM-AngF		-.78	.34	-.30*	.10	.11		-.94	.58	-.23	.05	.05		-2.89	1.12	-.31*	.10	.11
3	Parent-other stress	.07*	.08	.02	.59**	.31	.45	.04	.11	.03	.50**	.25	.33	.05^	.32	.06	.68**	.46	.85
	Preocc. SOM-AngF		-.57	.34	-.22^	.04	.04		-.68	.59	-.16	.03	.03		-2.26	1.13	-.24*	.06	.06
	stress by AngF		-.02	.01	-.29*	.07	.08		-.03	.02	-.23	.05	.05		-.06	.03	-.24^	.06	.06
1	Preocc. SOM-Pas	.00	-.15	.48	-.05	.00	.00	.02	.77	.77	.15	.02	.02	.01	1.07	1.76	.09	.01	.01
2	Parent-other stress	.24**	.07	.02	.51**	.24	.32	.15**	.08	.03	.40**	.15	.18	.33**	.28	.06	.59**	.33	.49
	Preocc. SOM-Pas		-.51	.44	-.16	.03	.03		.31	.74	.06	.00	.00		-.45	1.49	-.04	.00	.00
3	Parent-other stress	.02	.08	.02	.58**	.25	.33	.04	.06	.03	.29^	.06	.06	.00	.27	.07	.57**	.24	.32
	Preocc. SOM-Pas		-.63	.45	-.20	.04	.04		.60	.76	.12	.01	.01		-.33	1.57	-.03	.00	.00
	stress by Passivity		-.01	.01	-.15	.03	.03		.03	.02	.23	.04	.04		.01	.04	.04	.00	.00
1	Infant attach avoid	.11*	.48	.21	.33*	.11	.12	.00	.11	.36	.05	.00	.00	.03	.97	.81	.18	.03	.03
2	Parent-other stress	.23**	.06	.02	.48**	.23	.30	.17**	.09	.03	.42**	.17	.20	.35**	.28	.06	.59**	.35	.54
	Infant attach avoid		.51	.18	.35**	.12	.14		.15	.33	.06	.00	.00		1.09	.65	.21	.04	.04
3	Parent-other stress	.03	.05	.02	.41**	.14	.16	.02	.10	.03	.47**	.19	.23	.00	.27	.06	.57**	.28	.39
	Infant attach avoid		.51	.18	.35**	.12	.14		.15	.33	.06	.00	.00		1.09	.66	.21	.04	.04
	stress by avoid		.01	.01	.19	.03	.03		-.01	.01	-.15	.02	.02		.01	.03	.05	.00	.00

		Internalising						Externalising						Total					
Step	**Model**	**R^2 Δ**	**B**	**SE**	**Beta**	**sr^2**	**f^2**	**R^2 Δ**	**B**	**SE**	**Beta**	**sr^2**	**f^2**	**R^2 Δ**	**B**	**SE**	**Beta**	**sr^2**	**f^2**
1	Infant attach anxiety	.03	-.37	.30	-.19	.03	.03	.01	-.22	.50	-.07	.01	.01	.01	-.50	1.12	-.07	.01	.01
2	Parent-other stress	.29**	.07	.02	.56**	.29	.41	.20**	.10	.03	.47**	.20	.25	.39**	.31	.06	.65**	.39	.64
3	Infant attach anxiety		-.67	.27	-.34*	.11	.12		'-.63	.47	-.20	.04	.04		-1.79	.92	-.25^	.06	.06
	Parent-other stress	.04	.08	.02	.65**	.33	.49	.02	.11	.03	.53**	.22	.28	.04	.35	.06	.73**	.43	.75
	Infant attach anxiety		-.64	.26	-.32*	.10	.11		-.60	.47	-.19	.03	.03		-1.68	.90	-.23^	.05	.05
	stress by anx		-.01	.01	-.23	.04	.04		-.02	.01	-.16	.02	.02		-.05	.03	-.22^	.04	.04
1	Internalising	-	-	-	-	-	-	.20**	.73	.22	.45**	.20	.25	.66**	2.97	.33	.81**	.66	1.94
2	Internalising	-	-	-	-	-	-	.05^	.53	.25	.33*	.08	.09	.05^	2.52	.35	.69**	.37	.59
	Parent-other stress		-	-	-	-	-		.05	.03	.26^	.05	.05		.12	.05	.26^	.05	.05
3	Internalising	-	-	-	-	-	-	.05^	.78	.28	.48**	.14	.16	.02^	2.91	.40	.70**	.37	.59
	Parent-other stress		-	-	-	-	-		.05	.03	.24	.05	.05		.12	.04	.25^	.05	.05
2	stress by int		-	-	-	-	-		-.02	.01	-.27^	.05	.05		-.02	.01	-.18^	.02	.02
1	Externalising	.20**	.28	.09	.45**	.20	2.45	-	-	-	-	-	-	.71**	1.90	.19	.84**	.71	2.45
2	Externalising	.10*	.19	.09	.31*	.08	.75	-	-	-	-	-	-	.07**	1.63	.19	.72**	.43	.75
	Parent-other stress		.04	.02	.34*	.10	.08		-	-	-	-	-		.13	.04	.28**	.07	.08
3	Externalising	.00	.19	.09	.31*	.08	.75	-	-	-	-	-	-	.00	1.63	.19	.72**	.43	.75
	Parent-other stress		.04	.02	.34*	.10	.08		-	-	-	-	-		.14	.04	.29**	.07	.08
2	stress by ext		.00	.00	.03	.00	.00		-	-	-	-	-		.00	.01	-.03	.00	.00

Beta- standardised regression coefficients, B- unstandardised regression coefficients, sr2- semi partial correlation. ^ p<.10, * p<.05, ** p<.01, *** p<.001. f^2= Cohen's effects size= $r^2/(1-r^2)$, .02 small, .15 medium, .35 large

7.5 Summary and conclusions

This study has addressed a significant gap in the social emotional adjustment knowledge by investigating conditions of early risk in infants less than two years of age for the development of toddler problem behaviours. Findings in this study supported the prediction of toddler internalising and externalising problem behaviours by both early rearing environment and genetic risk factors including parenting stress, maternal depression, infant attachment avoidance and difficult temperament. Neither positive nor negative marital relations explained a significant amount of the variance in toddler internalising or externalising problem behaviours.

Concurrent parenting stress arising from within the parent-child relationship explained 27% of the variance in toddler internalising problem behaviours, compared with 22% from stress arising from the mother's relationships with others. From the early infancy constructs, social emotional difficulty explained 45%, maternal depression 35%, and difficult temperament around 20% of the variance in toddler internalising problem behaviours. Infant attachment avoidance also explained around 12% of the variance. The effect of infant attachment avoidance however was not mediated by parenting stress.

Contrary to expectation neither maternal nor infant attachment anxiety explained variance in toddler internalising problem behaviours. Further the relations were in the negative and not positive direction as had been hypothesised. The negative relation with maternal AAI *Involving anger with her father* did approach significance however. These results were discussed in terms of low- to moderate levels of attachment anxiety acting as a protective factor for internalising problem behaviours. Similarly, this study found AAI *Idealisation of mother* was also a protective factor against the development of toddler internalising problem behaviours.

Concurrent parenting stress arising from within the parent-child relationship explained 23% of the variance in toddler externalising problem behaviours, compared with 20% from stress arising from the mother's relationships with others. From the early infancy constructs, social emotional difficulty explained 26%, maternal depression 15%, and difficult temperament around 18%, of the variance in toddler externalising problem behaviours. Maternal attachment avoidance, represented by AAI *Derogation of mother*, explained 7% of the variance in toddler externalising problem behaviours. AAI *Derogation of mother* may be associated with a harsh, rejecting emotional climate in the home, resulting in increased conflict between toddler and parents. The negative relation between externalising problem behaviours and maternal attachment anxiety, represented by AAI *Involving anger with mother*, explained 6% of the variance. AAI *Involving anger with mother* may be associated with increased expressed emotion and a desire to parent differently on behalf of the mother. This may result in more sensitive parenting and less conflict between toddler and mother.

Contrary to expectation although relations between infant attachment avoidance and anxiety and externalising problem behaviours were in the expected directions, positive and negative respectively, they were not significant. It is possible limited power in a low risk sample prevented the detection of small effects of infant attachment on externalising problem behaviours. Nonetheless the results provide an indication of the relatively minor role played by infant attachment in the prediction of toddler externalising problem behaviours. Similarly, neither positive nor negative marital relations explained any of the variance in toddler externalising problem behaviours.

There was support for partial mediation of the effects of early risk factors by concurrent parenting stress. Toddler externalising problem behaviours were particularly affected by early social emotional difficulty and maternal depression regardless of parenting stress levels. The effects of early difficult temperament and infant attachment avoidance on toddler internalising problem behaviours were moderated by concurrent parenting stress. Concurrent parenting stress attenuated

the protective effects of both early positive marital relations and a mother's expressed involving anger with her father, on toddler internalising problem behaviours.

The large covariation between toddler internalising and externalising problem behaviours demonstrated in this study was similar to that reported in older children. Maternal, child and relationship risk factors included in this study generally explained more variance in toddler internalising than externalising problem behaviours. Thus it would seem rearing environment effects on toddler externalising problem behaviours may be more related to aspects of parenting such as involvement, discipline and limit setting, than just the emotional climate in the home represented in this study by parenting stress, maternal depression and attachment and positive and negative marital relations.

This study has extended previous infant problem behaviour research in several ways. Risk factors were assessed very early in infancy, when the infants were just 4 months old. The effects of a combination of risk factors including maternal, child and relationship factors on toddler internalising, externalising and total problem behaviours were investigated, including the potential buffering effect of positive marital relations. Attachment effects were found to be relatively minor compared with effects of difficult temperament, early socioemotional difficulty, maternal depression and parenting stress. This study also included a theoretical conceptualisation of the organising role of parenting stress in the development of toddler problem behaviours and an investigation of potential differential effects of different sources of parenting stress on the development of toddler problem behaviours. Stress arising from a mother's relationship with her child was generally found to be less influential than stress arising from her relationships with others. The next chapter will adopt a person-centred approach to the identification of mother-infant dyads at risk for developing toddler problem behaviours.

Chapter 8

Investigation 3: Identifying infants at risk for toddler internalising and externalising problem behaviours from growth trajectories across infancy of parenting stress and infant social emotional difficulty

Chapter 8 Investigation 3: Identifying infants at risk for toddler internalising and externalising problem behaviours from growth trajectories across infancy of parenting stress and infant social emotional difficulty

8.1 Introduction

Discussion in chapter one highlighted the complexity of human development over time. Research presented variation in constructs such as parenting stress and infant socioemotional adjustment both within groups and over time. Regression analyses conducted in the previous chapter did not take this variation into account. Correlations between variables captured the average similarity between risk factors and toddler problem behaviours at set points in time. For some variables this was when infants were 4 months old. Infant attachment was assessed at 12 months and parenting stress at 24 months. Further, the regression analyses were constrained to investigating interactions between two variables at a time. Thus the variable-centred, correlational analyses conducted in the previous chapter represented one snapshot in time of simplistic relationships between sample and not individual variation in risk factors and toddler problem behaviours (Asendorpf, 2013).

The model of pathways to parenting stress in mothers with 12 month old infants investigated in chapter six, also represented a simplified snapshot of real life complexity. Human development is much more complex than can be captured in variable-centred research designs. Person-centred approaches involve identifying similar groups of individuals on a variable of interest. Implicit in these groups are the net effects of multiple underlying interactions between many constructs. Thus person-centred approaches address limitations of variable-centred approaches by implicitly capturing real world complexity.

Variable- versus person-centred approaches shed light on different aspects of the relationships between mothers' parenting stress and infants' socioemotional

difficulty across the first two years and the development of toddler problem behaviours. Variable-centred analyses conducted in the previous two chapters explored average relations between selected risk factors and parenting stress in mothers of 12 month old infants in chapter six and toddler problem behaviours in chapter seven. From the path analysis in chapter six it was concluded mothers' parenting stress was determined by several factors including maternal attachment anxiety and depression and infant difficult temperament. From the regression analyses in chapter seven it was concluded mother's parenting stress and infant socioemotional difficulty were important factors in the development of toddler problem behaviours.

Person-centred analyses in this chapter will examine differences in toddler problem behaviours between groups of mothers with similar trajectories of parenting stress and groups of infants with similar trajectories of socioemotional difficulty across infancy. Types of individual developmental pathways may have different effects on levels of toddler problem behaviours. Mothers with similar patterns of variation in parenting stress levels across her infant's first two years may have toddlers with similar levels of problem behaviours. Similarly infants with similar patterns of socioemotional development across their first two years may exhibit similar levels of problem behaviours at two years of age.

Thus similar groups of mothers and infants are the variables of interest in this chapter. In the previous two chapters average relations between continuous variables were investigated. The person-centred investigations conducted in this chapter provide a complementary perspective to the variable-centred investigations of the development of parenting stress at 12 months and toddler problem behaviours at 24 months conducted in the previous two chapters. Person-centred analyses have increased practical utility to identify groups of mothers and infants at risk for the development of toddler problem behaviours. This has the potential to inform targeted prevention and intervention programs.

Research reviewed in chapter one concluded around 10% of toddlers exhibit problem behaviours above the borderline clinical range. Latent class and growth analyses conducted in populations of older infants from 18 months of age have demonstrated profiles of risk were already established by the time children were two years old. In one of the few studies investigating problem behaviours in younger infants, Van Zeijl et al. (2006) demonstrated externalising problem behaviours were established even earlier, by the end of an infant's first year of life. Overall however there is little information regarding classes of problem behaviours, growth trajectories and associated risk profiles in children younger than two years old, particularly in low risk populations. Whereas the CBCL has demonstrated utility, particularly for identifying externalising problem behaviours from parent report, in infants one year and older, the ASQ:SE questionnaire screens for social emotional difficulty in infants from just 4 months of age. Thus it may be useful in identifying infants at early risk for later problem behaviours.

The importance of parenting stress in the development of toddler problem behaviours has been emphasised throughout this study. In the previous chapter, parenting stress was found to explain a substantial amount of variance in both toddler internalising and externalising problem behaviours. Path analysis in chapter six demonstrated multiple pathways to parenting stress in mothers of twelve month infants. The previous two chapters demonstrated proximal risk factors such as early maternal attachment anxiety, maternal depression and infant difficult temperament assessed when infants were just 4 months old were influential both in the development of parenting stress and toddler problem behaviours. Chronic stress in the infant's rearing environment has been shown to be associated with negative developmental outcomes including internalising and externalising problem behaviours. Thus at risk mother-infant dyads may also be identified by elevated parenting stress across infancy.

8.1.1 Classes of two year old toddlers according to levels of problem behaviours

Whilst most toddlers do not exhibit clinically significant levels of internalising and externalising problem behaviours, research suggests there is a small percentage, around 10%, who do. These toddlers may continue to have problems as they develop. Early identification would inform targeted interventions and optimise social and emotional development in those toddlers who are at risk for ongoing difficulty. Confirmatory factor analyses in low risk populations of older children have identified four types of problem behvaiours (Keiley, Lofthouse, Bates, Dodge & Pettit, 2003). These have represented children who differed according to symptom type. Classes may differentiate toddlers with predominantly internalising versus externalising problem behaviours. Latent class analysis may also reveal a group of toddlers with co-occuring internalising and externalising problem behaviours. Alternatively they may reflect differences in symptom levels and not type.

This study will conduct a latent class analysis of toddler problem behaviours using maternal report of the CBCL syndrome scales. Understanding the characteristics of the different classes of toddler problem behaviours would shed light on etiology and potential underlying developmental mechanisms including co-occurrence. At least two classes of toddlers with “elevated” and “low” levels of problem behaviours are expected.

8.1.2 Growth trajectories of parent-other and parent-child stress across infancy

Whereas chapter two described parenting stress as relatively stable and slightly decreasing over the preschool period, little is known of the course of parenting stress across infancy. This is particularly the case for low risk populations and infants under 14 months of age. In chapter two research by Crnic, Gaze and Hoffman (2005) described three parenting stress trajectories of mothers of preschool children, high (13%), low (65%) and fluctuating (22%). Parents of infants aged 14 to 36 months in a high risk sample have also been grouped into three trajectories of high (7%), increasing (10%) and decreasing (83%) stress (Chang & Fine, 2007). Difficult temperament and maternal depression were associated with the high

trajectory. Thus it was expected at least two trajectories of chronically high versus chronically low parenting stress will exist in low risk mothers of infants aged between 4 and 24 months. However this is yet to be tested.

It is possible trajectories may be different for parent-other versus parent-child parenting stress. Parent-child stress is expected to be highest early in the first year when mother and infant are establishing their relationship and the infant is developing rhythmicity and sleeping patterns. Parent-child stress is expected to increase again in the second year during the transition to toddlerhood. Thus, a u-shaped trajectory may be expected for parent-child stress with higher stress when infants are 4 and 24 months old than when they are 12 months old. As the mother's resources are likely to be used predominantly in supporting her infant's development in the first 24 months, stress arising from her relationships with others is likely to remain relatively stable across infancy. Thus a relatively flat parent-other stress trajectory may be expected across infancy. This study will investigate parent-other and parent-child stress trajectories in mothers from when their infants are 4 to 24 months old in a low risk population.

Whilst it is expected that most mothers will have chronically low parenting stress levels, a group of mothers with chronically high stress levels is also likely. There may also be a further group with changing stress levels, perhaps due to external stressful life events. Differences in mother and infant characteristics between the trajectories will be compared. It is expected mothers in a high stress trajectory will have higher levels of risk factors such as maternal depression, infant difficult temperament, maternal and infant attachment anxiety and negative marital relations, consistent with the path model of parenting stress constructed in chapter six.

The previous chapter demonstrated concurrent parenting stress was important in the expression of toddler internalising and externalising problem behaviours. This this chapter will adopt a person-centred approach to determine the course and determinants of mothers' parenting stress across infancy. Toddlers of mothers in

elevated stress trajectories are expected to have higher levels of internalising and externalising problem behaviours. Separate parent-other and parent-child stress trajectories when infants are aged between 4 and 24 months will be investigated. This will inform what sources of parenting stress across infancy are important to the development of toddler internalising versus externalising problem behaviours.

Regression analyses in the prevous chapter established early social emotional difficulty was also a significant risk factor for toddler internalising and externalising problem behaviours. The next section will outline the identification of at risk infants from trajectories of social emotional difficulty actoss infancy.

8.1.3 Socioemotional difficulty trajectories in the first two years of life

The previous chapter focused on the prediction of toddler internalising and externalising problem behaviours from risk factors including attachment anxiety and avoidance, difficult temperament, maternal depression and parenting stress. Variable-centred analyses are important as they help to delineate patterns of risk and protection. Whereas research has demonstrated a small group of children from age two upwards exhibit clinically significant levels of problem behaviours, there is currently little information regarding trajectories of problem behaviours in younger children, less than two years old, particularly in low risk populations. This chapter will also investigate social emotional difficulty trajectories of infants across their first two years of life, from 4 to 24 months of age. A person-centred approach will identify infants at risk and determine risk profiles for problem behaviours.

Findings from latent class and growth analyses conducted on problem behaviours in children aged 18 months and upwards were described in chapter one. These studies demonstrated profiles of risk were already established by the time children were two years old. In a longitudinal study from 18 to 30 months, Mathiesen and Sanson (2000) reported most infants, around 80%, had low levels of problem behaviours and less than 5% of infants had persistent elevated levels of problem behaviours. Externalising problem behaviours emerged around 12 months of age, peaked during toddlerhood, decreased into preschool and remained

relatively stable throughout the rest of childhood. Internalising problem behaviours appeared to emerge later, possibly coinciding with the development of cognitive capacities of self-evaluation and reflection. There was some support for high and rising depression and anxiety symptoms in children from one and a half years of age. Developmental precursors may be evident earlier in infancy and/or early emerging problem behaviours may manifest in a different form from later, observable internalising behaviours.

From research reviewed in chapter one it was concluded child problem behaviour trajectories differed by symptom level and not type. Classes differentiated by symptom type may unfold with increased age. Research has reported three or more risk profiles in populations of either high risk or older children. It was expected there will be fewer than three risk profiles in infancy in this study's low risk population due both to the relatively undifferentiated nature of infant symptom expression and the low levels of problem behaviours demonstrated in low risk populations. This study will examine trajectories of social emotional difficulty as a global marker of problem behaviours across infancy ,from 4 to 24 months, assessed using the Ages and Stages Social Emotional Questionnaire (ASQ:SE; Squires, Bricker & Twombly, 2002). Early signs of social emotional difficulties assessed in the ASQ:SE include regulation difficulties, sleep problems and food refusal in first year. Growth mixture modeling (Muthen & Muthen, 2001) will be used to estimate social emotional difficulty trajectories and examine their efficacy in predicting toddlers' internalising versus externalising problem behaviours at two years of age.

Discussion in chapter one has characterised children from two years of age upwards with persistent problem behaviours by temperamental and familial risk, including negative parenting, maternal depression and family stress. In a low risk study of six month old infants, 8% of infants had elevated social emotional difficulties, assessed by maternal report using the Social Emotional Ages and Stages Questionnaire (Vissenberg, 2010). Mothers' feelings of attachment to their baby decreased with the number of difficulties reported. In a study of older infants aged 18 months, maternal depression and parenting stress, but neither mother-infant

relationship quality nor maternal availability, were related to infant social emotional difficulty (Salmonssen & Sleed, 2010).

Profiles of early risk associated with social emotional difficulty trajectories will also be investigated. Recent research has reported no effect of infant attachment security on internalising problem behaviours trajectories in children aged 2 to 10 years. Dimensions of infant attachment anxiety and avoidance may be more sensitive predictors than attachment security and more relevant in a younger population. Consistent with prior research presented in chapter one and the previous chapter's findings, it was expected at risk infants will have elevated levels of contextual risk, including higher parenting stress, maternal depression, difficult temperament, negative marital relations and maternal and infant attachment anxiety and avoidance than infants not at risk of social emotional difficulty. At risk infants may also be in families with lower maternal reported positive marital relations.

Prior research has demonstrated associations between early problem behaviour trajectories from two years of age and subsequent internalising and externalising problem behaviours in primary school aged children. In the current study, infant social emotional difficulty trajectories from 4 to 24 months were expected to predict CBCL toddler internalising and externalising problem behaviours at two years of age. Thus this chapter will also investigate the prediction of toddler internalising and externalising problem behaviours from infant social emotional difficulty trajectories.

8.1.4 Summary

This chapter will report on person-centred analyses conducted to characterise classes of two year old toddlers from a low risk population according to their levels of internalising and externalising problem behaviours. It was expected most toddlers exhibited levels of problem behaviours in the normal range. A small group of toddlers, around 10%, were expected to have elevated, clinically significant levels of internalising and externalising problem behaviours. Similarly, growth trajectories

across infancy are expected to demonstrate most mother-infant dyads are not at risk. However toddlers in dyads with mothers with elevated parenting stress and/or infants with elevated social emotional difficulty across infancy, were expected to exhibit elevated levels of problem behaviours. Profiles of early risk, when infants are just 4 months old, were expected to include elevated materal attachment anxiety and depression and infant difficult temperament.

8.2 Method

8.2.1 Participants

Participants for this study were described in chapter six.

8.2.2 Measures across infancy

8.2.2.1 Toddler internalising and externalising problem behaviours

Problem behaviours were assessed when toddlers were two years of age using the CBCL as described in the previous chapter.

8.2.2.2 Parenting stress across infancy at 4, 12 and 24 months

Mothers reported parent-other and parent-child stress when their infants were aged 4, 12 and 24 months using the PSI as described in chapter six.

8.2.2.3 Social and emotional difficulty at 4, 12 and 24 months

Social and emotional difficulty across infancy was assessed at 4, 12 and 24 months using the Ages and stages socioemotional adjustment screening questionnaires (Squires, Bricker & Twombly, 2002) described in the previous chapter.

8.2.3 Procedure

Refer to chapter six.

8.2.4 Statistical procedures

SPSS software version 11.0 (SPSS Inc., 2001) was used for the descriptive statistics and sample characteristics. Parenting stress and social emotional difficulty latent growth trajectories across 4, 12 and 24 months and the CBCL latent class analysis were estimated using Mplus (Muthen & Muthen, 2006). Separate analyses were run for models with increasing numbers of trajectories or classes starting with a single trajectory/class model. The number of latent trajectories/classes was determined by a combination of the Chi square statistic having probability less than .05, the model with the lowest Bayesian Information Criterion (BIC) and a Vuong-Lo-Mendell-Rubin likelihood ratio test probability of less than .05. Mothers and infants were assigned to their most probable trajectory estimated by Mplus. Manovas were used to investigate differences between trajectories on background variables and measures of maternal attachment anxiety and avoidance, maternal depression, positive and negative marital relations and infant difficult temperament at 4 months and infant attachment anxiety and avoidance at 12 months. Trajectory membership was also used to predict toddler internalising, externalising and total problem behaviours at 24 months using Anovas.

Missing data was less than 5% for maternal and infant attachment anxiety and avoidance and difficult temperament and less than 10% for positive and negative marital relations and maternal depression. Parent-child and parent-other stress measures were missing for between 10% and 15% of the sample at 4 and 12 months. Measures were missing for approximately two thirds of the original sample at 24 months due to study attrition. Manova revealed mothers who remained in the study had more formal education ($F(1,78)=4.50$, $p<.05$) and higher negative marital relations ($F(1,78)=3.69$, $p=.06$) than those who did not. There were no differences on any of the other background demographic variables nor the study constructs at 4 and 12 months for those participants who remained in the study at 24 months compared with those who did not return their 24 month questionnaires ($F(19,60)=1.10$, $P>.05$). Missing data was assumed to be missing at random (Schafer & Graham, 2002) and was handled using Full Information Maximum Likelihood imputation (Allison, 2001; Muthen and Muthen, 2006).

8.3 Results

8.3.1 Participant characteristics

Participants have been described in chapter six.

8.3.2 Toddler internalising and externalising problem behaviours

Toddler problem behaviours have been described in the previous chapter.

8.3.3 Parenting stress when infants were 4, 12 and 24 months old

Parent-other and parent-child stress characteristics, means, standard deviations and correlations when infants were 4 and 12 months old, were presented in Table 6.1. Correlations across infancy were presented in Table 7.2.

8.3.3.1 Parent-other and parent-child stress when infants were 4 months old

There was good internal consistency for the parent-other and parent-child stress scales (α=.86 and α=.85 respectively). When their infants were 4 months old mothers' average parent-other stress was around the 50th percentile. On average parent-child stress and total parenting stress were lower than parent-other stress, around the 40th percentile. Parenting stress levels in either the parent or child domains were elevated, above the 85th percentile, for fifteen percent of the sample. Mother reported life stress scores ranged from 0 to 36. The average life events stress score was 11.6 ($\overline{SD}$=7.5). Parent-child and parent-other stress were strongly associated (r=.58, p<.01). Mothers' life event stress was not associated with relationship stress either from their relationship with their child or with others.

8.3.3.2 Parent-other and parent-child stress when infants were 12 and 24 months old

Parenting stress levels reported by mothers when their infants were 12 and 24 months old were described in chapters six and seven respectively.

Differences in average parent-other and parent-child stress across 4, 12 and 24 months were investigated separately by two Anovas. Parent-child stress differed across 4, 12 and 24 months ($F(2,40)=4.65$, $p<.05$). Parent-child stress at 4 and 24 months did not differ significantly ($F(1,41)=1.33$, $p>.05$). However parent-child stress at 12 months was significantly lower than at 4 and 24 months ($F(1,104)=13.61$, $p<.0001$ and $F(1,44)=4.42$ respectively, $p<.05$). The pattern across infancy was similar for parent-other stress. Parent-other stress differed across 4, 12 and 24 months ($F(2,41)=4.05$, $p<.05$). Parent-other stress at 4 and 24 months did not differ significantly ($F(1,42)=.47$, $p>.05$). As for parent-child stress, parent-other stress at 12 months was significantly lower than at 4 and 24 months ($F(1,104)=15.68$, $p<.0001$ and $F(1,43)=4.15$, $p<.05$ respectively).

8.3.4 Social emotional difficulty when infants were 4, 12 and 24 months old

8.3.4.1Social emotional difficulty when infants were 4 months old

Social emotional difficulty when infants were 4 months old was described in chapter six.

8.3.4.2 Social emotional difficulty when infants were 12 and 24 months old

On average mothers reported relatively low levels of social emotional difficulty well below at risk levels in their infants aged 4, 12 and 24 months ($\overline{X}=25.44$, $\overline{X}=19.24$, $\overline{X}=21.48$ and $\overline{SD}=2.61$, $\overline{SD}=1.83$, $\overline{SD}=2.13$ respectively). Mothers rated 14%, 6% and 9% respectively of their 4, 12 and 24 month old infants with elevated social emotional difficulty scores. Average social emotional difficulty was relatively stable across infancy although the Anova did approach significance ($F(2,45)=2.07$, $P<.10$). Deleted post hoc comparison here.

8.3.5 Latent class analysis of toddler internalising, externalising and total problem behaviours

Latent class analysis was conducted on the six CBCL syndrome scales, emotionally *reactive, anxious/depressed, somatic complaints and withdrawn, attention problems* and *aggressive behavior*. An increasing number of classes were

investigated starting with a baseline single class. As for the latent growth analyses, the model with the smallest AIC and BIC and Vuong-Lo likelihood ratio with a probability <.05 indicated the model with the best fit. Fit statistics are presented in Table 8.1 indicating a three class solution provided the best fit to the CBCL internalising and externalising syndrome scales.

The three classes presented in Figure 8.1 comprised toddlers with low internalising and externalising problem behaviours (74%), one toddler (2%), with anxiety/depression and withdrawn internalising symptoms in the borderline clinical range, and an elevated aggressive behaviour class (24%). Note however that average aggressive behaviour in the latter class was still below the borderline clinical range.

The internalising toddler had higher attention problems ($\overline{X}$=2.00, $\overline{SD}$=1.38 versus $\overline{X}$=1.61, $\overline{SD}$=.23) and aggressive behaviour ($\overline{X}$=9.00, $\overline{SD}$=3.84, versus $\overline{X}$=7.33, $\overline{SD}$=.64), than toddlers in the low class. Mean differences could not be explored due to there being only one internalising toddler. Similarly, externalising toddlers had significantly higher levels of internalising symptoms than toddlers in the low problem behaviours class for the *emotionally reactive, anxious/depressed* and *somatic complaints* scales but not the *withdrawn* scale (*emotionally reactive*: $\overline{X}$=3.63, $\overline{SD}$=.22 versus $\overline{X}$=.72, $\overline{SD}$=.12, F(1,45)=135.47, p<.01; *anxious/depressed*: $\overline{X}$=2.18, $\overline{SD}$=.33 versus $\overline{X}$=.94, $\overline{SD}$=.18, F(1,45)=10.85, p<.01; *Somatic complaints*: $\overline{X}$=2.27, $\overline{SD}$=.37 versus $\overline{X}$=.97, $\overline{SD}$=.20, F(1,45)=9.55, p<.01; *withdrawn*: $\overline{X}$=1.00, $\overline{SD}$=.26 versus $\overline{X}$=.56, $\overline{SD}$=.14, F(1,45)=2.28, P>.05).

Thus the three classes of toddlers effectively represented those with low, internalising with some externalising and externalising with some internalising problem behaviours. The classes did not distinguish between toddlers with pure internalising or externalising symptoms versus those with mixed symptoms with dominance in either domain.

Table 8.1

Fit statistics for latent class analysis of maternal reported CBCL toddler internalising and externalising problem behaviour syndrome scales

No. of trajectories	Log likelihood	No. of free parameters	AIC	BIC	LMR p for K-1
1	-565.02	12	1154.04	1176.49	
2	-525.07	19	1088.15	1123.70	.10
3	-500.39	26	1052.78	1101.43	.01
4	-491.43	33	1048.86	1110.61	.23

Note: AIC=Akaike information criterion; BIC=Bayesian information criterion; LMR = Vuong-Lo

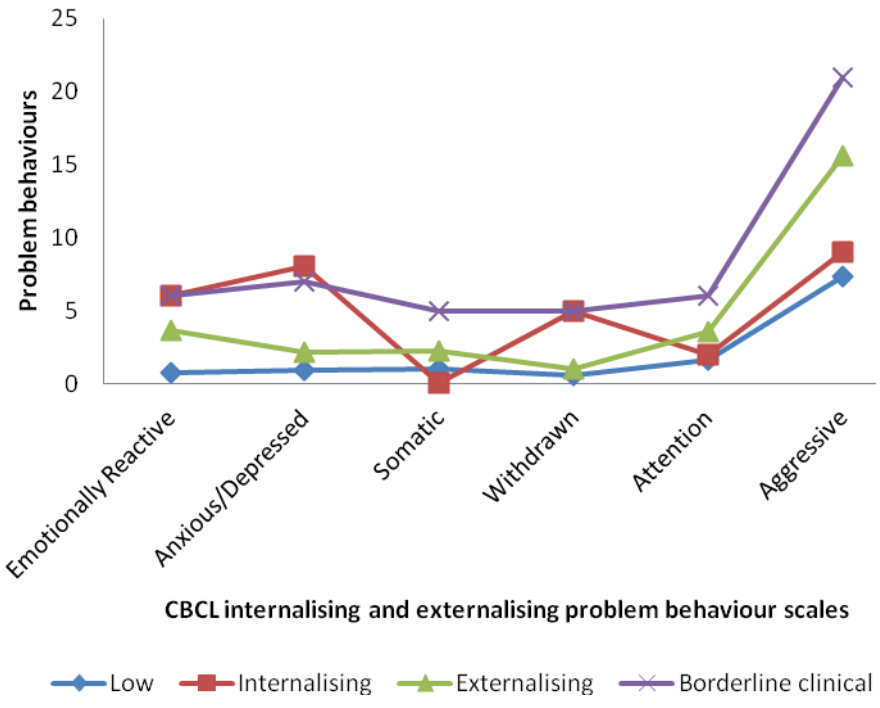

Figure 8.1 Latent classes of mother reported toddler CBCL internalising and externalising syndrome scales

8.3.6 Latent growth trajectories at 4, 12 and 24 months of parent-other versus parent-child stress for low risk mothers

8.3.6.1 Latent parent-other stress trajectories of low risk mothers across infancy from 4 to 24 months

A latent growth mixture analysis was used with Mplus software to determine the number and shape of mothers' parent-other stress trajectories across infancy at 4, 12 and 24 months of age. Fit statistics are provided in Table 8.2. There were marginal decreases in the AIC and marginal increases in the BIC from 1 through to 3 trajectories. Vuong-Lo probabilities just failed to reach significance for the two and three trajectory models. The non significant Vuong-Lo test for the two trajectory model indicated the single trajectory model failed to be rejected. Similarly, the non significant Vuong-Lo test for three trajectory model indicated the two trajectory model failed to be rejected. There were marginal differences in the fit statistics between the two and three trajectory models. Adopting the three trajectory model may involve overextraction (Bauer &Curran, 2003). A two trajectory model has appealing practical utility in identifying at risk mother-infant dyads in a community sample. Thus it was decided to adopt the two trajectory model. The fit statistics indicated parent-other stress in mothers across infancy from 4 to 24 months could be adequately described by two trajectories, low (84%) and elevated (16%), as shown in Figure 8.2.

Average parent-other stress levels were significantly lower in the low versus elevated trajectories ($F(1,104)=101.55$, $p<.0001$). The estimated average parent-other stress intercept in the *low* trajectory was 109.92 ($\overline{SD}=2.69$) and corresponded to around the 30th Percentile. The estimated average parent-other stress intercept in the *elevated* trajectory was 161.40 ($\overline{SD}=7.14$) and was above the 90th percentile. Note that the average parent-other stress intercept in the elevated trajectory was higher than the 85th Percentile (raw score of 148), which is considered the cut off for elevated parent-other stress. The average slope for the *low* trajectory differed significantly from zero and was negative ($\overline{M}=-.70$, $\overline{SD}= .21p<.01$). The slope of the elevated parent-other stress trajectory approached significance in the negative

direction ($\overline{M}$=-.73, $\overline{SD}$=.41, p=.08). Thus on average parent-other stress decreased across infancy in both the l*ow* and *elevated* trajectories. Trajectory membership explained 8.5%, 96% and 59% of the variance in mothers' parent-other stress when their infants were aged 4, 12 and 24 months respectively.

Table 8.2

Growth model fit statistics for K = 1, 2, and 3 parent-other and parent-child stress trajectories when infants were aged 4, 12 and 24 months

No. of trajectories	Log likelihood	No. of free parameters	AIC	BIC	LMR p for K-1
Parent-other stress					
1	-1143.26	8	2302.52	2324.48	
2	-1138.74	11	2299.47	2329.67	.10
3	-1134.70	14	2297.41	2335.84	.09
4	-1131.11	17	2296.22	2342.88	.59
Parent-child stress					
1	-1052.71	8	2121.41	2143.23	
2	-1047.77	11	2117.53	2147.53	.30
3	-1042.11	14	2112.43	2150.41	.04
4	-1037.80	17	2109.59	2155.96	.40

Note: AIC=Akaike information criterion; BIC=Bayesian information criterion; LMR = Vuong-Lo

Differences in the background variables in the low versus elevated trajectories were investigated by a Manova (Appendix 13). When infants were 4 months old, mothers in the *low* versus *elevated* parent-other stress trajectories did not differ on the background variables of maternal age, family income, parental relationship duration, number of siblings, or maternal education. However mothers in the *elevated* parent-other stress trajectory spent more hours per week at 4 months separated from their baby as a result of working at least part-time ($\overline{X}$= 13.13 versus $\overline{X}$=3.17, $\overline{SD}$= 1.88 versus $\overline{SD}$=.82 respectively, F(1,91)=23.66, p<.001). Mothers in the *elevated* parent-other stress trajectory also spent more hours per week separated from their infant at 12 months ($\overline{X}$= 20.41 versus $\overline{X}$=11.48, $\overline{SD}$= 2.69 versus $\overline{SD}$=1.27

respectively, F(1,103)=6.79, p<.001). By 24 months however, there was no difference in the number of hours per week of mother-infant separation between the elevated and low parent-other stress trajectories ($\overline{X}$= 21.38 versus $\overline{X}$=16.67, $\overline{SD}$= 4.54 versus $\overline{SD}$=2.31 respectively, F(1,37)=.86, P>.05).

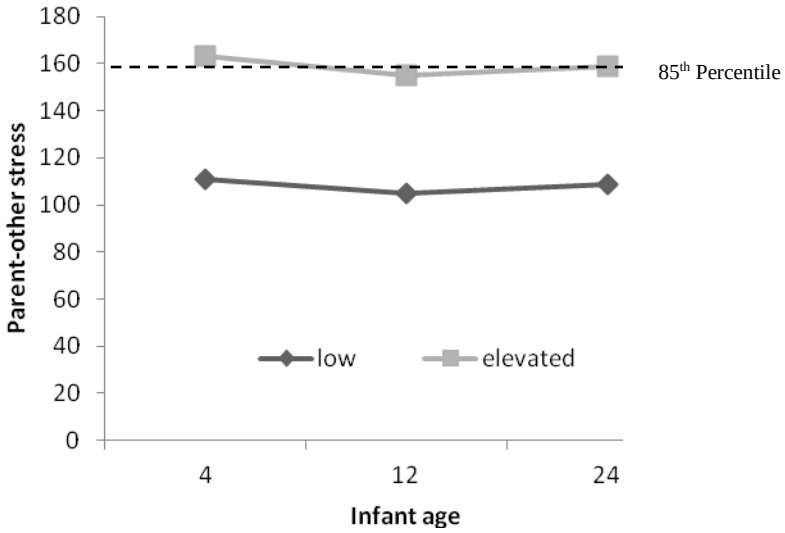

Figure 8.2 Low and elevated parent-other stress trajectories in low risk mothers when their infants were aged 4, 12 and 24 months

A Manova was also used to compare the *low* and *elevated* parent-other stress trajectories on average levels of the predictors used earlier in the path analysis. Mean levels and F ratios are shown in Appendix 13. Average levels of maternal depression, maternal attachment anxiety, negative marital relations and infant difficult temperament when infants were 4 months old were higher for the mothers in the *elevated* versus the *low* parent-other stress trajectory. Note that the average depression score for mothers in the *elevated* trajectory was above the CES-D cut off score of 16 ($\overline{X}$=22.37, $\overline{SD}$=1.59). Note also that the average infant difficult temperament score of mothers in the *elevated* parent-other stress trajectory ($\overline{X}$= 2.95, $\overline{SD}$=.14), approached that of difficult infants, being one standard deviation above the sample mean ($\overline{X}$=2.49, $\overline{SD}$=.67; Sanson, Prior, Garino, Oberklaid & Sewell, 1987).

The difference between average maternal attachment avoidance in the *low* versus *elevated* parent-other stress trajectories approached significance (F(1,106)=2.88, p=.09). Mothers in the *elevated* parent-other stress trajectory had lower maternal attachment avoidance than those in the *low* parent-other stress trajectory. There was no difference between the *low* and *elevated* parent-other stress trajectories on average levels of positive marital relations at 4 months and infant attachment anxiety or avoidance at 12months. Lastly, parent-child stress was higher in the *elevated* versus the *low* parent-other stress trajectories at 4, 12 and 24 months.

8.3.6.2 Latent parent-child stress trajectories in low risk mothers of infants aged 4, 12 and 24 months

Latent linear growth mixture analyses were conducted for mothers' parent-child stress as for parent-other stress. The fit statistics suggested either the two or three trajectory models adequately described parent-child stress across infancy (Table 8.2). Consistent with parent-other stress, it was decided to adopt the two trajectory model, low (76%) and elevated (24%), as shown in Figure 8.3.

Average parent-child stress levels were significantly lower in the *low* versus *elevated* trajectories (F(1,104)=101.55, p<.0001). The average estimated parent-child stress intercept in the *low* trajectory was below the 30th percentile compared with around the 85th percentile in the *elevated* trajectory ($\overline{X}$=84.47, $\overline{SD}$=2.60 and $\overline{X}$=116.89, $\overline{SD}$=14.76 respectively). Average parent-child stress in the *elevated* trajectory was 111.68 ($\overline{SD}$=4.31) and was around the 75th percentile just below the elevated parent-child stress threshold. Average parent-child stress in the *low* trajectory was 86.15 ($\overline{SD}$=2.99) and was around the 25th percentile. The average slope of the *low* parent-child stress trajectory was significantly different from zero ($\overline{M}$=-.38, $\overline{SD}$=.18, p>.05). The average slope of the *elevated* parent-child stress trajectory was not significantly different from zero ($\overline{M}$=-.39, $\overline{SD}$=.30, p>.05). Note however that the mean slopes for the low versus elevated parent-child stress trajectories were similar. The standard deviation for the *elevated* trajectory was

larger than for the *low* trajectory, thus accounting for the non-significant result. Thus, similar to parent-other stress, on average parent-child stress decreased across infancy in both the *low* and *elevated* trajectories. Trajectory membership explained 71%, 41% and 44% of the variance in mothers' parent-child stress when their infants were aged 4, 12 and 24 months respectively.

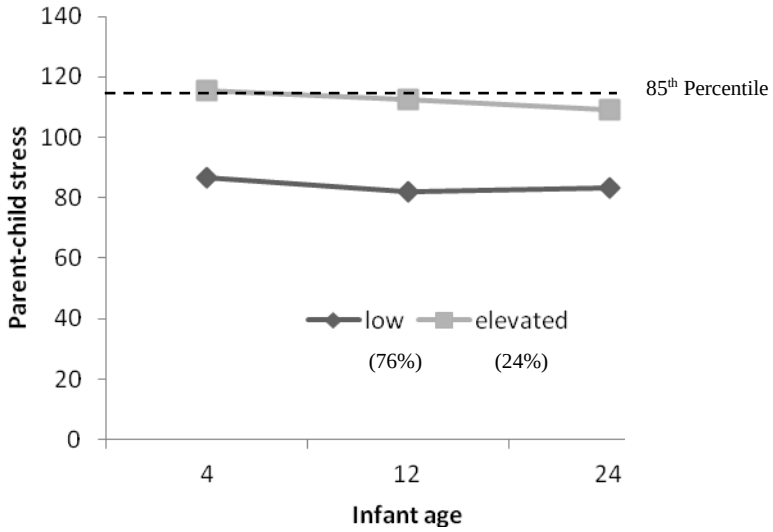

Figure 8.3 Low and elevated parent-child stress trajectories in low risk mothers when their infants were aged 4, 12 and 24 months

Differences in background variables in the *low* versus *elevated* parent-child stress trajectories were investigated by a Manova as for parent-other stress. The *low* versus *elevated* parent-child stress trajectories did not differ on the background variables of maternal age, family income, number of siblings, relationship length, maternal education, or mother-infant separation at 4 months. Similarly there was no difference between *low* and *elevated* parent-child stress trajectories on number of hours per week of mother-baby separation at 12 or 24 months (Appendix 13).

As for parent-other stress, differences between the *low* and *elevated* parent-child stress trajectories on the predictors used in the path analysis were also investigated using a Manova (Appendix 13). On average, positive marital relations, maternal attachment anxiety and avoidance, and infant attachment anxiety and

avoidance did not differ across the *low* and *elevated* parent-child stress trajectories. Mean levels of maternal depression, negative marital relations and difficult temperament were higher in the *elevated* versus *low* parent-child stress trajectories. Note that, as for parent-other stress, the average depression score for mothers in the *elevated* parent-child stress trajectory was above the CES-D cut off score of 16 ($\overline{X}$=19.45, $\overline{SD}$=1.63). Note also that the average infant difficult temperament score of mothers in the *elevated* parent-child stress trajectory ($\overline{X}$= 2.91, $\overline{SD}$=.14), approached that of difficult infants, being one standard deviation above the sample mean ($\overline{X}$=2.49, $\overline{SD}$=.67); Sanson, Prior, Garino, Oberklaid & Sewell, 1987). Lastly, parent-other stress was higher in the *elevated* versus *low* parent-child stress trajectories at 4, 12 and 24 months.

8.3.6.3 Parent-other versus parent-child stress trajectory concordance and continuity

Most of the mothers, 74%, were in the *low* trajectory for both parent-other and parent-child stress. Mothers who were in the *low* parent-child and *elevated* parent-other stress trajectory made up 5% of the sample. Thirteen percent of mothers were in the *elevated* parent-child and *low* parent-other stress trajectory. The remaining 8% of mothers were in the *elevated* trajectory for both parent-other and parent-child stress. Thus, 82% of mothers had concordant parent-other and parent-child stress trajectories (low-low or high-high).

8.3.6.4Prediction of toddler internalising and externalising problem behaviours from parent-other and parent-child stress trajectory membership

Mothers' parent-other and parent-child stress trajectory membership was used to predict mother reported internalising, externalising and total problem behaviours in their 24 month old toddlers. On average, mothers in the *elevated* parent-other stress trajectory reported higher internalising and total problem behaviours in their two year old toddlers than those in the *low* trajectory ($F(1,40)=7.72$, $p<.01$, $\overline{X}$=8.38, $\overline{SD}$=1.32 versus $\overline{X}$=4.29, $\overline{SD}$=.64). Average mother reported externalising problem behaviours were also higher for infants of mothers in

the *elevated* parent-other stress trajectory, however this difference just failed to reach significance (F(1,40)=3.99, p=.05, $\overline{X}$=15.63, $\overline{SD}$=2.23 versus $\overline{X}$=10.76, $\overline{SD}$=1.08). Infants of mothers in the *elevated* versus *low* parent-child stress trajectories had higher internalising (F(1,40)=11.85, p<.01, $\overline{X}$=8.03, $\overline{SD}$=1.04 versus $\overline{X}$=3.87, $\overline{SD}$=.66), externalising (F(1,40)=13.55, p<.01, $\overline{X}$=16.75, $\overline{SD}$=1.65 versus $\overline{X}$=9.57, $\overline{SD}$=1.04), and total problem behaviours (F(1,40)=18.83, p<.01, $\overline{X}$=41.08, $\overline{SD}$=3.58 versus $\overline{X}$=22.70, $\overline{SD}$=2.26). Note that average internalising, externalising and total problem behaviours for both the *low* and *elevated* stress trajectories were within the normal range.

8.3.7 Growth trajectories of social emotional difficulty across infancy

8.3.7.1 Latent social emotional difficulty trajectories at 4, 12 and 24 months of low risk mothers

A latent growth analysis was conducted using Mplus software to determine the number of social emotional difficulty trajectories in infants at 4, 12 and 24 months of age using the same procedure as in chapter six. Model fit statistics are presented in Table 8.3. There were marginal decreases in the AIC and BIC in the growth models containing 1 versus 2 trajectories. Comparison of the fit statistics for the 2 versus 3 trajectory models indicated a marginal decrease in the AIC and a marginal increase in the BIC. The significant Vuong-Lo test for the two trajectory model indicated rejection of the single trajectory model. The non significant Vuong-Lo test for three trajectory model indicated that the two trajectory model failed to be rejected. Thus it was concluded a two trajectory model best described the infant social emotional difficulty data. The two trajectories were interpreted as *low* social emotional difficulty and "*at risk*" for social emotional difficulties and contained 88.4% and 11.6% of the infants respectively as shown in Figure 8.4.

Table 8.3

Growth model fit statistics for K = 1, 2, and 3 social emotional difficulty trajectories when infants were aged 4, 12 and 24 months

No. of trajectories	Log likelihood	No. of free parameters	AIC	BIC	LMR p for K-1
1	-1289.67	5	2589.33	2604.04	
2	-1259.10	8	2534.21	2557.74	.00
3	-1253.89	11	2529.77	2562.13	.48

Note: AIC=Akaike information criterion; BIC=Bayesian information criterion; LMR = Vuong-Lo

Infants in the *low* trajectory had relatively stable social emotional difficulty across infancy with average levels around 20 which is well below the elevated cut-off of between 45 and 50. The estimated average social emotional difficulty intercept in the *low* trajectory was 19.76 ($\overline{SD}$=1.20) and the slope was not significantly different from zero ($\overline{X}$=-.02, $\overline{SD}$=.15, p>.05). On average, infants in the *at risk* trajectory had initially high and decreasing social emotional difficulty across infancy. Average social emotional difficulty levels in *at risk* infants were above the cut-off of 45 at 4 months, around the cut-off of 48 at 12 months and below the cut-off of 50 when they were 24 months old. The estimated average social emotional difficulty intercept in the *at risk* trajectory was 64.89 ($\overline{SD}$=6.00). The *at risk* slope was negative and significantly different from zero ($\overline{X}$=-2.85, $\overline{SD}$=.84, p<.01). On average social emotional difficulty was higher in the *at risk* infants than infants in the *low* trajectory when they were 4 and 12 months old ($\overline{X}$=67.86, $\overline{SD}$=3.51 versus $\overline{X}$=20.66, $\overline{SD}$=1.28 respectively at 4 months and $\overline{X}$=39.23, $\overline{SD}$=4.00 versus $\overline{X}$=20.34, $\overline{SD}$=1.44 respectively at 12 months). By 24 months of age however there was no difference on average in social emotional difficulty between the *at risk* and *low* trajectories ($\overline{X}$=30.00, $\overline{SD}$=6.28 versus $\overline{X}$=20.19, $\overline{SD}$=2.14 respectively).

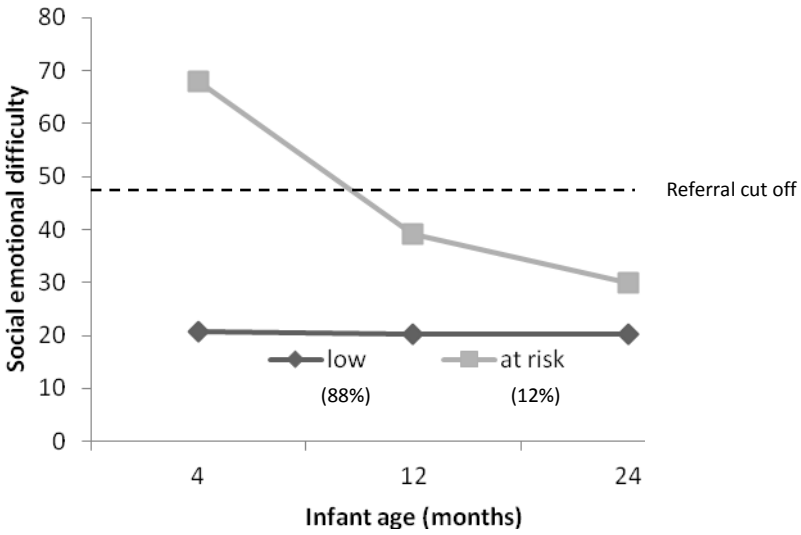

Figure 8.4 Low and "at risk" infant social emotional difficulty trajectories when infants were aged 4, 12 and 24 months

ASQ:SE item profiles for the *low* and *at risk* infants at 4, 12 and 24 months are presented in Figure 8.5. A Manova revealed on average infants in the *at risk* versus *low* social emotional difficulty trajectories had higher scores on all of the 19 items in the questionnaire used when the infants were 4 months old with the exception of items 4, 6, 7 and 15 (Appendix 14). These items concerned behaviours that were either less relevant to young infants, such as Item 6 "letting the mother know when they were hungry or sick", or were low frequency problem behaviours such as Item 4 "stiffening or arching when picked up". The items with the largest mean differences included Item 9 "cries for long periods", Item 12 "takes longer than 30 minutes to feed", and Item 16 "has trouble falling asleep". Thus 4 month old *at risk* infants were experiencing regulation difficulties concerning feeding, sleeping and crying.

Similarly, the *at risk* infants had higher scores on average on Items 1,8,9,10,15,17 and 20 on the 12 month social emotional difficulty questionnaire. Elevated items included Item 1 "Does your baby laugh or smile at you?", Item 8 "Is your baby's body relaxed?, Item 9 "Does your baby cry, scream or have tantrums for long periods of time?", Item 10 "Is your baby able to calm himself down?", Item 15 "Does your baby have trouble falling asleep at nap time or night?", Item 17 "Does

your baby sleep at least 10 hours in a 24 hour period?" and Item 20 "When you talk to your baby does he turn his head, look or smile?. When the infants were 24 months old, the *at risk* infants had higher scores on average on 12 of the 26 items, particularly on Item3 "Does your child laugh or smile when you play with her?", Item 6 "Does your child greet or say hello to familiar adults?", Item 11 "Does your baby cry, scream or have tantrums for long periods of time?", Item 16 "Does your baby have trouble falling asleep at nap time or night?", and Item 25 "Does your child try to hurt other children or animals?". Thus, compared with infants with *low* social emotional difficulty, *at risk* 12 and 24 month old infants had lower social engagement and continued to have regulation difficulties concerning sleeping and crying.

8.3.7.2 Concordance between parent-other and parent-child stress and infant social emotional difficulty trajectory membership

Most mothers, 87%, in the *low* parent-other stress trajectory had infants in the *low* social emotional difficulty trajectory. However only one third of infants with mothers in the *elevated* parent-other stress trajectory were in the *at risk* social emotional difficulty trajectory. Similarly, most mothers, 94%, in the *low* parent-child stress trajectory had infants in the *low* social emotional trajectory. One quarter of infants with mothers in the *elevated* parent-child stress trajectory, were in the *at risk* social emotional difficulty trajectory. Chi square analyses revealed mothers' membership in the parent-other and parent-child stress trajectories was associated with their infants' membership in the social emotional difficulty trajectories ($\chi^2(1)= 8.35$, $p<.01$ and $\chi^2(1)= 6.03$, $p<.05$ respectively).

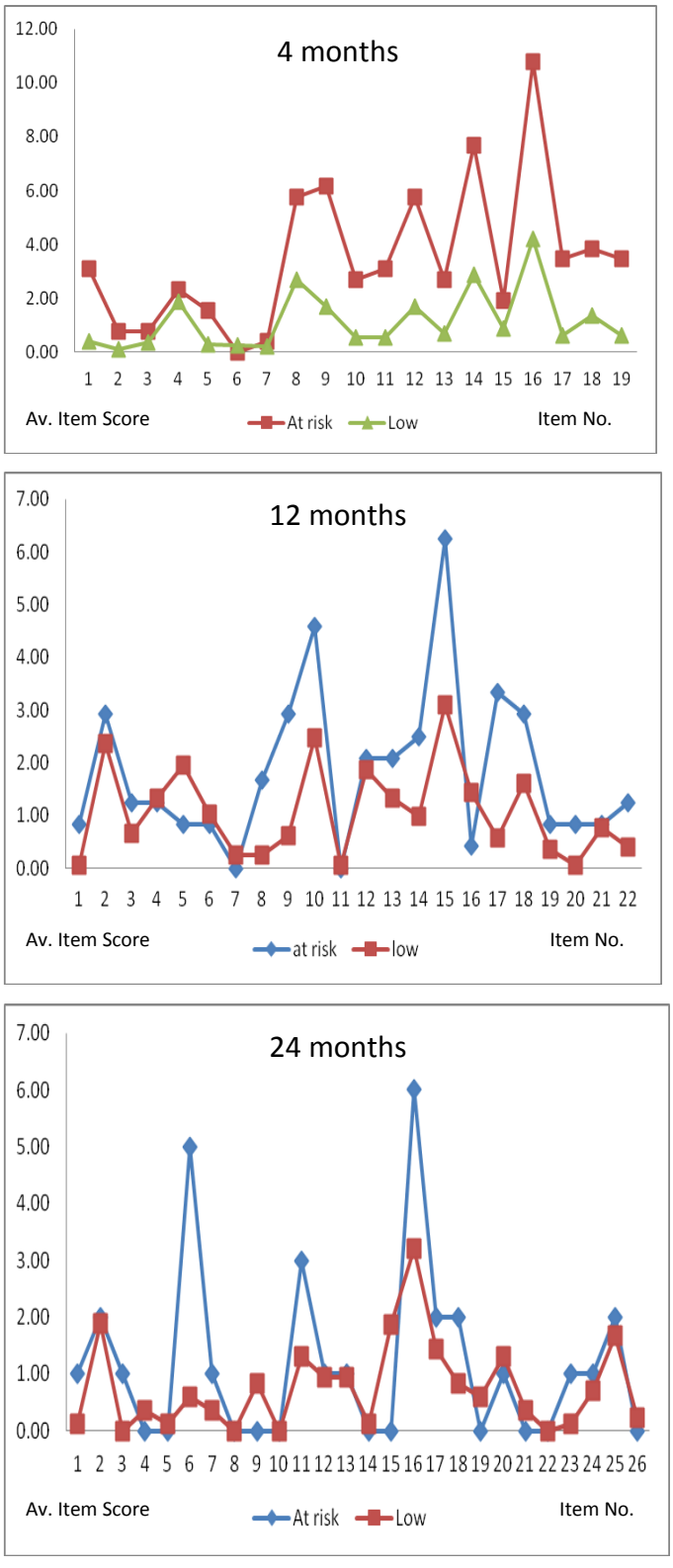

Figure 8.5 *At risk* and low infant social emotional difficulty item profiles at 4, 12 and 24 months of age

8.3.7.3 Social emotional difficulty trajectory risk profile analysis

Differences in the background variables for infants in the low versus *at risk* social emotional difficulty trajectories were investigated by a Manova. Results are presented in Appendix 15. At 4 months, infants in the *at risk* versus *low* social emotional trajectories did not differ on the background variables of maternal age, family income, parental relationship duration, number of siblings, maternal education, maternal employment or mother-infant separation. There was also no difference in the number of hours per week mothers and infants were separated at 12 or 24 months.

A Manova was also used to compare the infants in the *low* and *at risk* social emotional difficulty trajectories on average levels of the predictors used earlier in the regression analyses. Mean levels and F ratios are shown in Appendix 15. Average levels of maternal depression, infant difficult temperament and parent-other and parent-child stress at 4 months were higher for the infants in the *at risk* versus *low* social emotional difficulty trajectories. Note that the average depression score for mothers with infants in the *at risk* social emotional difficulty trajectory was above the CES-D cut off score of 16 ($\overline{X}$=27.20, $\overline{SD}$=2.46). Note also that the average infant difficult temperament score of mothers in the *at risk* trajectory ($\overline{X}$= 2.99, $\overline{SD}$=.20), approached that of difficult infants, being one standard deviation above the sample mean ($\overline{X}$=2.49, $\overline{SD}$=.67; Sanson, Prior, Garino, Oberklaid & Sewell, 1987). Similarly average parent-other ($\overline{X}$= 157.70, $\overline{SD}$=8.33), and parent-child ($\overline{X}$= 120.20, $\overline{SD}$=5.62), stress scores of mothers with infants in the *at risk* trajectory were above the elevated 85th percentile. Mothers of infants in the *at risk* versus *low* social emotional difficulty trajectories did not differ with respect to maternal and infant attachment anxiety and avoidance or positive marital relations. The higher negative marital relations reported by mothers of *at risk* versus *low* social emotional difficulty infants however approached significance ($F(1,105)=2.88$, $p<.10$).

8.3.7.4 Prediction of internalising, externalising and total problem behaviours from social emotional difficulty trajectory

As for the parent-other and parent-child stress trajectory analyses, social emotional difficulty trajectory membership was used to predict mother reported toddler internalising, externalising problem and total behaviours at 24 months. On average, *at risk* infants had higher mother reported internalising problem behaviours than those in the *low* trajectory ($F(1,44)=7.56$, $p<.01$, $\overline{X}=9.75$, $\overline{SD}=1.81$ versus $\overline{X}=4.55$, $\overline{SD}=.56$). Mother reported externalising problem behaviours however did not differ between "*at risk*" infants and those in the *low* trajectory on average ($F(1,44)=1.30$, $p>.05$, $\overline{X}=15.00$, $\overline{SD}=3.11$ versus $\overline{X}=11.29$, $\overline{SD}=.96$). Total problem behaviours were higher on average in *at risk* than *low* infants ($F(1,44)=6.77$, $\overline{X}=43.25$, $\overline{SD}=6.77$ versus $\overline{X}=26.57$, $\overline{SD}=2.09$). Note that average internalising, externalising and total problem behaviours for both the *low* and *at risk* trajectories were within the normal range.

8.4 Discussion

8.4.1 Sample characteristics

Mothers' parent-other and parent-child stress trajectories and infant social emotional difficulty trajectories were estimated across infancy using data provided when infant participants were 4, 12 and 24 months old. Unfortunately, over half the participants did not return their questionnaires when their infants were 24 months old. This was attributed largely to the lack of direct contact with participants by the researcher at this stage of the study in contrast to the 4 and 12 month data collection phases. Participants at 24 months did not differ from those who dropped out of the study after 12 months on either average background variables or study constructs. Thus data imputation using the Mplus Missing at Random (MAR) algorithm to estimate the trajectories seemed justified.

8.4.2 Mothers' parent-other and parent-child stress across infancy

Parenting stress was measured when the infant was 4, 12 and 24 months old using the Parenting stress index (PSI; Abidin, 1995). The parent domain of the PSI was conceptualised as representing parent-other stress arising from a mother's

relationship with herself and others apart from her infant. The child domain of the PSI was conceptualised as representing parent-child stress arising directly from a mother's relationship with her infant. Both parent-other and parent-child average stress levels were low across infancy consistent with the low risk nature of the sample. On average mothers of infants two years and under reported parent-other and parent-child stress between the 25th and 50th percentiles. Parent-other stress on average was higher than parent-child stress across infancy. Between 7-18% of mothers had parent-other or parent-child stress levels above the elevated 85th percentile when their infants were aged between 4 and 24 months old.

On average, parenting stress arising from both a mother's relationship with her child and with others, decreased from when their infants were 4 to 12 months old. The birth of a child has been well documented as a particularly stressful time in the marital relationship (Cowan & Cowan, 1995; Deater-Deckard, 2004; Miller & Sollie, 1980). The first few months of an infant's life can be a tiring and stressful time as the mother-infant dyad develop their relationship and the mother learns what her infant needs and how to help him or her become regulated. Not surprisingly then, stress is likely to extend across both the mother's relationships with her infant and with others. Relationship tension may be expected as differences of opinion in child rearing arise with the child's father and others. Becoming a parent is a major life transition and a time where all relationships are renegotiated through adaption to the new circumstances. By the end of the baby's first year routines are usually well established and parents have adapted to their new circumstances. This was reflected in lower parenting stress in mothers when their infants were 12 months old compared with when they were newborns at 4 months of age.

As expected, average parent-child stress increased in the second year, presumably due to the additional challenges posed on the mother-infant relationship due to the infants' increasing autonomy. Average parent-other stress also increased in the second year. Mothers reported parent-other and parent-child stress when their infants were 24 months old at similar levels to when their infants were 4 months old. Thus toddlerhood presented challenges for mothers both directly, with

respect to their relationship with their infant, and also with respect to their relationships with themselves and others. The relationship renegotiations required during this important developmental transition may reveal differences in opinion between a mother and her spouse, family and wider social network, on areas such as parental discipline, expectations and boundary setting. These differences may add to the stress a mother feels in her relationships with others during her infant's second year. Hence, there were similar patterns across infancy for stress arising from within the parent-child relationship compared with stress arising from a mother's relationships with others.

Note that PSI norms for parent-other and parent-child stress start when the child is 1 year old. Raw scores for the 85th percentile at 12 months for parent-child and parent-other stress are similar to the overall raw scores for children up to 12 years old (114 versus 116 and 150 versus 148 respectively). This suggests that parenting stress at 12 months is relatively similar to parenting stress in parents of older children. By the end of the first year, mother, infant and the family have generally settled into their new routines and thus parenting stress can be expected to be lower in mothers when their infant is 12 months compared with 4 months old.

Raw scores for the 85th percentile for parent-child and parent-other stress in parents of two year olds are 122 and 149 respectively. Note that these are higher than for parents of 1 year olds. Thus the increase in parent-child and parent-other stress when infants were aged 1 year to 2 years found in this study is consistent with the PSI norms (Abidin, 1995). There are no norms available for parenting stress when the child is less than 12 months old. The results of this study suggest ed average parenting stress levels when the infants are 4 months old are similar as for 24 months. The only other period of childhood where stress levels are as elevated is at 4 years, during the preschool period. Thus parenting stress across childhood is highest at the developmental transitions of birth, toddlerhood and preschool.

8.4.3 Social emotional difficulty across infancy

Infants had low social emotional difficulty on average in their first two years of life. Mothers rated less than 15% of their 4 month old infants with social emotional difficulty above the referral cut-off. This dropped to less than 10% of their infants when they were 12 and 24 months of age. Average social emotional difficulty scores of around 20 were consistent with the ASQ:SE technical report data presented for infants not at risk and with two or more risk factors such as low family income or low maternal education. Average social emotional difficulty scores in this study were also consistent with Vissenberg (2010) who reported an average score of 15 in a low risk sample of 300 Dutch 6 month old infants, with 3% above the cutoff. Salmonsson and Sleed (2010) reported an average social emotional difficulty score of around 40, close to the borderline, in their small cross sectional sample of help seeking Swedish mothers. The mothers in the Swedish had expressed a need for psychological help either for themselves or their infant. The higher average social emotional difficulty scores in the Swedish study compared with this study is consistent with their higher risk sample.

8.4.4 Classes of toddler problem behaviours

Latent class analysis of the CBCL syndrome scales revealed the sample contained three classes of toddlers with different types of problem behaviours. Most toddlers had low levels of both internalising and externalising problem behaviours. Around one fifth of the sample had elevated externalising problem behaviours although these were still within the normal range on average. There was one toddler with clinical level internalising problem behaviours. Thus findings were consistent with the low risk nature of the sample. Given the relatively low levels, it seems likely most of the toddlers in the elevated externalising class were exhibiting normative behaviours associated with the developmental transition to toddlerhood. It is possible the relatively small sample size restricted differentiation of further classes with clinical levels of problem behaviours as have been demonstrated in prior studies discussed earlier (Keiley, Lofthouse, Bates, Dodge & Pettit, 2003). Protracted study beyond infancy in a larger sample would provide clarification.

8.4.5 Associations between latent parent-other and parent-child stress trajectories across infancy and toddler problem behaviours

This study addressed another gap in the parenting stress literature that was highlighted in chapter three and the introduction to this chapter. Namely, that there is little knowledge of the course and levels of parenting stress across infancy, especially in low risk populations. Previous longitudinal parenting stress research has focused on preschoolers and older children. Research has also focused on global parenting stress using the PSI (Chang & Fine, 2007; Muslow, Caldera, Pursley, Reifman & Huston, 2002), or daily hassles stress from the work of Crnic and colleagues (Crnic & Booth, 1991; Crnic, Gaze & Hoffman, 2005). There has been little prior research on the course of different aspects of parenting stress across infancy in a low risk population. This study addressed this gap using latent growth mixture analyses with longitudinal data to empirically derive trajectories of parent-other and parent-child stress in mothers whose infants were aged from 4 to 24 months.

Two trajectories, *low* versus *elevated*, were found to adequately describe both parent-other and parent-child stress in mothers across the first two years of their infants' life. The average stress levels and proportions of mothers in each trajectory were different for parent-other versus parent-child stress. Overall parent-other stress was generally higher than parent-child stress. Average parent-other stress levels were around the 45th percentile whereas average parent-child stress was around the 30th percentile. There were fewer mothers in the *elevated* parent-other stress trajectory compared with the *elevated* parent-child stress trajectory, 16% versus 24% respectively. Hence, there were more mothers in the *low* parent-other than *low* parent-child stress trajectory, 84% versus 76% respectively. However average stress levels were higher in the parent-other versus parent-child *elevated* stress trajectories, greater than 90th versus 85th percentiles respectively. Parent-other and parent-child stress levels were comparable in the *low* trajectory, around the 30th percentile. Note that average stress levels in the *elevated* parent-other and parent-child stress trajectories were at the PSI cut off for elevated stress (Abidin, 1995).

On average parent-other and parent-child stress levels were around the 50th percentile across infancy. Mothers' stress levels were higher when their infants were 4 and 24 months old compared with when they were 12 months old as described earlier. Latent growth analyses revealed however that the sample could be split into two groups of mothers with *low* and *elevated* stress respectively. Results of the latent growth mixture analyses revealed parent-other and parent-child stress decreased on average across infancy in both the *low* and *elevated* trajectories. Note that this would appear to be mainly due to the decrease in parenting stress from 4 to 12 months. As can be seen in Figure 8.2 the *low* and *elevated* parent-other stress trajectories had similar shape, decreasing from 4 to 12 months and increasing again at a slower rate from 12 to 24 months. *Elevated* parent-child stress levels remained around the 85th percentile across infancy. The *low* parent-child stress trajectory was shaped similarly to the parent-other stress trajectories, namely decreasing from 4 to 12 months and increasing again slightly from 12 to 24 months.

This study demonstrated 16% and 24% mothers had *elevated* parent-child and parent-other stress levels respectively across infancy. This was consistent with the stable high trajectory comprising 13% mothers of preschoolers reported by Crnic, Gaze and Hoffman (2005). Note however that in their study, the two preschool stress levels, low and high, were forced using cut off scores. Results of this study were also similar to those of Chang and Fine (2007) who reported a stable high trajectory for 7% of their low income mothers whose infants were aged from 14 to 36 months. Stress levels in Chang and Fine's high trajectory were also above cut-off for the PSI short form (Abidin, 1990). The slightly decreasing course of parent-other and parent-child stress across infancy is different from the relatively stable levels of stress arising from everyday hassles reported across the preschool period (Crnic, Gaze & Hoffman). Results are similar however to those of Chang and Fine who reported decreasing stress in the majority of low income mothers across 14 to 36 months. Their chronically high trajectory was also decreasing although not significantly.

Whereas this study adopted two trajectories, Chang and Fine (2007) derived three parenting stress trajectories of chronically high (7%), increasing (10%) and

decreasing (83%) stress. The fit statistics in this study suggested either two or three trajectories. It was decided to adopt two trajectories as the *low* and *elevated* trajectory structure had practical appeal for identifying mothers at risk and also avoided potentially overfitting the data from a relatively small sample. The larger sample size in Chang and Fine's study may have unveiled a third pattern of increasing maternal parenting stress in their infants' second and third years. Stress levels in this third trajectory almost reached the stress levels of the stable high trajectory by 36 months. However there was no evidence in this study for an increasing trajectory. This may be a function of the lower risk sample, the younger age of the infants, or the smaller sample size compared with Chang and Fine's larger, low income sample.

Mothers in the *low* and *elevated* parent-other and parent-child stress trajectories were compared on background, maternal, child and relationship factors using Manovas. There were no differences between mothers in the *low* and *elevated* parent-child stress trajectories on any of the background variables including maternal age, education, marital relationship length, number of older siblings, family income, or number of hours per week mother-infant separation. Mothers in the *elevated* parent-other stress trajectory however were separated from their infant for more hours per week when their infants were 4 and 12 months old than mothers in the *low* parent-other stress trajectory. Thus returning to work before their infant was 12 months old was associated with increased parent-other but not parent-child stress across infancy.

Maternal depression, maternal and infant attachment anxiety and infant difficult temperament at 4 months were higher in the *elevated* than the *low* trajectory in both the parent-child and parent-other stress trajectories. This was consistent with Chang & Fine's (2007) findings of elevated depression and difficult temperament in their high parenting stress trajectory of low income mothers tracked from when their infants were 14 to 36 months old. Negative marital relations was higher in the *elevated* versus *low* parent-other stress trajectories, but did not differ across the parent-child stress trajectories. This was consistent with the earlier path analysis findings that negative marital relations were more influential in

determining parent-other than parent-child stress. Maternal attachment avoidance was significantly lower in the *elevated* versus the *low* parent-other and parent-child stress trajectory. This was consistent with expected lower reported parenting stress from mothers with increased attachment avoidance. Positive marital relations did not differ between the *low* and *elevated* parent-other or parent-child stress trajectories. Trajectory risk profiles were consistent with earlier path analysis findings in chapter six.

Thus the results of the variable centred path analysis of parenting stress at 12 months and person centred latent growth analyses across infancy mostly converge. Whereas the paths from infant attachment anxiety to parent-other or parent-child stress at 12 months were not significant, infant attachment anxiety levels were higher in *elevated* versus *low* stress trajectories. This was consistent with the argument put forward earlier, that the effects of infant attachment anxiety may be evident only at elevated stress levels. Similarly, infant difficult temperament was higher in the *elevated* versus *low* parent-other and parent-child stress trajectories, whereas the path from difficult temperament to parent-other stress was not significant in the path analysis. Thus, again, perhaps the effects of difficult temperament on parent-other stress are only evident at higher stress levels. Maternal attachment avoidance was lower in *elevated* parent-other and parent-child stress trajectories, whereas the paths from maternal attachment avoidance to parent-other and parent-child stress were not significant in the path analysis. Perhaps the effects of maternal attachment avoidance on parent-other and parent-child stress are also only evident at higher stress levels.

Parent-other stress levels were significantly higher in the *elevated* versus the *low* parent-child stress trajectory and vice versa. In other words there was a predictable association between membership in the two types of parenting stress trajectories. Thus those mothers who were relatively stressed in one domain tended to be similarly stressed in the other parenting stress domain. This was consistent with the highly significant correlations between parent-child and parent-other stress at 4, 12 and 24 months. Further, 82% of mothers were in concordant parent-child

and parent-other stress trajectories. Stress trajectory discordance was defined as being in a different trajectory for parent-other versus parent-child stress. For example, a mother may be in the *low* trajectory for parent-child stress versus the *elevated* parent-other trajectory or vice versa. Eighteen percent of mothers had discordant parent-child versus parent-other stress trajectories.

Thus this study has demonstrated parent-other and parent-child stress take a relatively similar, slightly decreasing course across infancy. *Elevated* versus *low* parent-other and parent-child stress trajectories differed in predictable ways on similar maternal, child and relationship variables including maternal attachment anxiety and avoidance, maternal depression and infant difficult temperament in a low risk sample of mothers with infants aged from 4 to 24 months. Negative marital relations was associated specifically with parent-other but not parent-child stress trajectories. There was no relation between positive marital relations and parent-other or parent-child stress trajectories across infancy.

Trajectory membership was associated with predictable differences in toddler internalising and externalising problem behaviours. Mothers in the *elevated* stress trajectories also reported more internalising, externalising and total problem behaviours in their two year olds. Levels of problem behaviours associated with *elevated* stress trajectories, which were at referral levels, however were still within the normal range. Thus whilst parenting stress has important implications for a mother's capacity to provide a supportive developmental environment for her child, this study has demonstrated infants are moderately resilient to exposure to persistent sub clinical levels of parenting stress across their first two years of life.

Thus trajectories of mothers' parent-other and parent-child stress took a similar course across infancy with similar determinants. There was high concordance between trajectory membership from different sources of parenting stress. Thus analyses in this study does not support difference in the course and determinants of different types of parenting stress contrary to proposals by some researchers reviewed in chapter three.

8.4.6 Associations between social emotional difficulty trajectories across infancy and toddler problem behaviours

Social emotional difficulty levels were generally low across infancy, however around 10% of infants were above the elevated referral cut off. This was consistent with prior research reporting similar levels of infants at risk for mental health disorders (Bayer, Hiscock, Ukoumunne, Price & Wake, 2008; Briggs-Cowan, Carter, Skuban, & Horwitz, 2001; Egger & Angold, 2006; Sawyer et al., 2000). Overall infant social emotional difficulty decreased across infancy from 4 to 24 months. As for parenting stress patterns, maternal reported social emotional difficulty was lowest when infants were 12 months old.

Latent growth analysis extracted two trajectories of "stable low" and "decreasing high" or "at risk" social emotional difficulty across infancy. Most infants, 88%, were in the *stable low* trajectory, with only 12% of infants in the *at risk* trajectory. This was consistent with prevalence statistics noted above. By two years of age there was no difference in infants' average social emotional difficulty levels between the *low* versus *at risk* trajectories. Thus, for some infants negotiating the developmental transition of birth and early infancy was more difficult, however the decreasing social emotional difficulty trajectory indicated that for most infants, these difficulties had settled down by the time the infants were two years old (Biringen, Emde, Campos & Applebaum, 1995).

It may be that due to normative toddler developmental challenges, social emotional difficulty around 24 months represents a convergence point. Further assessments beyond toddlerhood and into preschool would clarify whether the trajectories diverge again after two years of age. Other research in larger infant samples from 18 months of age however has identified a third group of infants, generally comprising less than 5% of the sample, with high, stable difficulties (Mathiesen & Sanson, 2000; NICHD, 2004) and Shaw & colleagues (Gilliom & Shaw, 2004; Owens & Shaw, 2003; Shaw, Gilliom, Ingoldsby & Nagin, 2003; Shaw, Owens,

Giovannelli & Winslow, 2001). It is likely the relatively small sample in the current study precluded differentiation of the *at risk* trajectory.

Trajectory membership was driven largely by differences in early social emotional difficulty when infants were just 4 months old. Early social emotional difficulty was represented by regulation difficulties associated mainly with settling and feeding. Findings in this study suggested these early challenges may have ongoing implications for ongoing social emotional difficulty and the development of problem behaviours in toddlerhood. Further assessments beyond toddlerhood would clarify whether early infant social emotional difficulty remained a risk factor for subsequent problem behaviours. If this were found to be the case, this study's findings of the importance of early social emotional difficulty in the first 4 months of life provides a cogent rationale for increased support of mothers and their infants both pre- and post-natally.

Early risk factors associated with the *at risk* social emotional difficulty trajectory included maternal depression, infant difficult temperament and parenting stress. Marital relations and attachment constructs did not differ across the *low* and *at risk* trajectories. Thus results built on earlier cross-sectional findings of associations between social emotional difficulty in infants under eighteen months and maternal stress and depression in a high risk sample (Salmonsson & Sleed, 2010). The prediction of social emotional difficulty in this study by maternal depression and difficult temperament was consistent with prior findings in high risk samples of boys (NICHD, 2004; Gilliom & Shaw, 2004; Owens & Shaw, 2003; Shaw, Gilliom, Ingoldsby & Nagin, 2003; Shaw, Owens, Giovannelli & Winslow, 2001; Tremblay et al., 2004). In contrast however this study did not find any predictive power from negative marital relations. This was most likely due to the relatively low level of negative marital relations in this low risk sample.

Research has emphasised the importance of early mother-child interaction in understanding the etiology of different developmental pathways of problem behaviours (NICHD, 2004). This study used maternal and infant attachment anxiety

and avoidance to assess the quality and effects of mother-infant interaction on infants' social emotional difficulty. Contrary to expectation neither maternal nor infant attachment anxiety nor avoidance were found to affect social emotional difficulty in infancy. Given the relatively low average levels of social emotional difficulty in this low risk sample, it is possible the effects of attachment anxiety and avoidance on the development of problem behaviours only become significant at higher, insecure levels, such as those seen in high risk samples. This makes intuitive sense as normal imperfections in human interaction have evolutionary adaptiveness and enable the growth of resilience necessary for mental health and well being.

Social emotional difficulty trajectories predicted differences in toddler internalising and total, but not externalising, problem behaviours. Note however that levels internalising problem behaviours in both the *low* and *at risk* trajectories were within the normal range. Thus, the regulation and social engagement difficulties observed by mothers in their infants may be more associated with internalising problem behaviours. Alternatively it may be that the normative peak in externalising problem behaviours observed in toddlers (Tremblay et al., 2004), masked any difference in association with *low* versus *elevated* social emotional difficulty. This could be clarified by further longitudinal research continuing from infancy beyond toddlerhood.

8.4.7 Stress and social emotional difficulty trajectory concordance

Analyses revealed significant concordance between infants' social emotional difficulty and mothers' parent-child stress trajectory membership. Thus mothers who reported high stress arising from their relationship with their child tended to also reported elevated social emotional difficulties in their infant across the first two years of life. In contrast concordance between parent-other stress trajectory and social emotional difficulty was much lower. High concordance may reflect construct overlap. However given the high concordance between parent-other and parent-child stress trajectories, a substantive explanation is also likely. Thus aspects of the child's behaviour that contribute to a mother's concerns about his or her social emotional difficulties may also contribute to increased stress arising from the

mother-infant relationship. A mother who is stressed due to a difficult child may find she has decreased resources to handle stress in other aspects of her life, thus resulting in increased parent-other stress as well. The direction of effects awaits further investigation.

8.4.8 Limitations

In addition to construct measurement and sample limitations discussed in chapter six, there were other limitations to the analyses conducted in this chapter. As for the previous chapter's regression analyses, estimations of the growth trajectories were affected by the significantly smaller sample size at the 24 month stage of the study compared with the 4 and 12 month stages (n=47 versus 137 and 121 respectively). Imputation was used to fill in the gaps in the 24 month data. Thus trajectories were based on estimated and not real data for over half the participants at the 24 month stage of the study. That said, constructs were shown to be relatively stable across infancy and the imputation methods adopted are widely used and accepted. Infant social emotional difficulty was the construct most likely to change across the developmental stages of infancy to toddlerhood. Thus the reduced sample size and resulting data imputation may have affected the lack of difference in social emotional difficulty at 24 months across trajectories.

8.5 Summary and conclusions

Analyses in this chapter addressed the relative lack of knowledge concerning the determinants and course of parenting stress and infant social emotional difficulty across infancy.The effects of early risk on trajectory membership and the effect of membership on the development of toddler problem behaviours were also investigated. Both elevated parenting stress and social emotional difficulty across infancy were shown to be effective in the identification of toddlers at increased risk for ongoing mental heath difficulties expressed as internalising or externalising problem behaviours.

Latent class analysis of maternal reported toddler CBCL syndrome scales produced three classes of toddlers with low (74%), internalising (2%) and externalising (24%) problem behaviours respectively. Only the toddler in the internalising class had borderline clinical level symptoms. Levels of problem behaviours in the *low* and *externalising* classes were within the normal range.

Latent growth mixture analyses produced *low* and *elevated* trajectories for parent-other, parent-child stress and infant social emotional difficulty across the first two years of life. Most of the mothers and infants, at least 80%, were in the *low* trajectories. *At risk* mothers and infants had referral levels of parenting stress and social emotional difficulty. Elevated stress and social emotional difficulty trajectories were associated with higher levels of problem behaviours, although these were still in the normal range consistent with the CBCL latent class analysis. Note that elevated social emotional difficulty predicted internalising but not externalising problem behaviours.

Parenting stress and social emotional difficulty were highest when infants were 4 months old. Both *low* and *elevated* parent-other and parent-child stress trajectories across infancy were u-shaped, peaking at 4 and 12 months and lower at 12 months. Patterns of change in parent-other and parent-child stress were similar across infancy. Most mothers, around four fifths, were in concordant parent-other and parent-child stress trajectories. Similarly, most infants in the *elevated* social emotional difficulty trajectory also had mothers in the *elevated* parent-child stress trajectory. Concordance was much lower between social emotional difficulty and parent-other stress trajectory membership. In contrast the course of social emotional difficulty trajectories differed across infancy with a stable *low* trajectory and a decreasing *at risk* trajectory. It was concluded the relatively small sample size may have precluded extraction of a stable high social emotional difficulty trajectory.

Mothers and infants in *elevated* versus *low* parenting stress and social emotional difficulty trajectories differed on maternal, child and relationship characteristics. Mothers in the *elevated* parent-other and parent-child stress

trajectories had higher maternal depression and attachment anxiety, lower maternal attachment avoidance, rated their infants as more difficult and had infants with higher attachment anxiety than mothers in the *low* trajectories. Mothers in the *elevated* parent-other stress trajectory also reported higher negative marital relations than mothers in the *low* parent-other stress trajectory. Mothers did not differ on their levels of reported positive marital relations regardless of whether they were in the *elevated* or *low* parent-other or parent-child stress trajectories. Thus this study also provided knowledge on the nature and determinants of growth trajectories of parent-other and parent-child stress in mothers of infants starting when they were just 4 months old.

Two trajectories of social emotional difficulty were found to be associated with predictable differences in risk factors, consistent with findings from the variable-centred analyses. Toddlers in the *at risk* trajectory, around 12%, had higher levels of toddler internalising and total but not externalising problem behaviours than the 88% of toddlers in the *low* trajectory. It was concluded toddlerhood may not be the best time to investigate risk profiles associated with externalising problem behaviours due to their normative peak at this time. Results from both the variable centred analysis in the previous chapter and this chapter's person-centred trajectories of social emotional difficulty highlighted the importance of risk factors present in early infancy for the development of toddler problem behaviours.

Chapter 9

Overall discussion and conclusions

Chapter 9: Overall discussion and conclusions

9.1 Introduction

This chapter will discuss the implications of longitudinal analyses conducted in chapters six, seven and eight investigating the effects of risk factors including maternal and infant attachment and parenting stress, on toddler problem behaviours. Maternal and infant characteristics in this study's low risk sample and observed relationships amongst study constructs will be compared with past studies. This will be followed by a discussion of observed relationships between maternal and infant dimensions of attachment avoidance and anxiety. The effectiveness of the attachment paradigm, whereby the mother is presumed to directly influence the development of her infant's problem behaviours through the mother-infant attachment relationship, will be explored. The hypothesised central role of parenting stress in the development of toddler problem behaviours will also be discussed. This will be followed by a discussion of the relations between trajectories of parenting stress and infant social emotional difficulty across infancy with toddler problem behaviours. Findings from the three empirical chapters will be drawn together to form an integrated picture of the transactional nature of the development of infant attachment, parenting stress and toddler problem behaviours. Limitations of this study, implications for promotion, prevention and intervention programs and directions for future research will also be discussed in this chapter.

9.2 Comparison of participants in the current study with prior low risk studies

The participants in this study were mostly middle class, Australian, first time mothers and their 4 month old infants living in two parent households. Mean occupation and weekly earnings were above the Australian average. Two thirds of the participants were first time mothers. Mothers ranged from 20 to 43 years of age, with an average age of 32 years at the beginning of the study. When infants were 4 months old, four fifths of the mothers were at home with their babies, not in paid

employment. The remaining one fifth of mothers were mostly working part-time, less than 30 hours per week. By the time the infants were 12 months of age, only two fifths of the mothers were at home with their infants, half were working part-time, less than 30 hours per week, and 5% of mothers were working full time, more than 30 hours per week. Proportions of stay at home, part and full time employed mothers were similar when infants were 12 and 24 months old. Family income increased across the study in accordance with mothers returning to paid employment. Of the infant participants, 48% were female and 52% were male.

Maternal reported risk factor data was collected when infants were 4, 12 and 24 months of age. Risk factors included including maternal depression, infant difficult temperament and social emotional difficulty, negative marital relations and parenting stress. Mothers also reported on their positive marital relations across infancy which had been hypothesised to be a protective factor for reducing parenting stress and toddler problem behaviours. When their infants were 4 months old, mothers participated in the Adult Attachment Interview which provided measures of maternal attachment anxiety and avoidance. Mothers and their infants participated in the Strange Situation when their infants were 12 months old which provided measures of infant attachment anxiety and avoidance. When infants were 24 months old, mothers and fathers also completed the CBCL to provide measures of toddler internalising, externalising and total problem behaviours.

On average risk factor levels in the current study were well below clinical or referral cut offs across infancy and were consistent with past low risk studies (Abidin, 1995; Achenbach & Rescorla, 2000; Belsky, Jaffee, Sligo, Woodward & Silva, 2005; Prior, Sanson & Oberklaid, 1989; Radloff, 1977; Sanson, Prior, Garino, Oberklaid & Sewell, 1987; Vissenberg, 2010). Proportions of mother or infant participants in the elevated range on any given risk factor ranged mostly between 5% and 15%. Exceptions included 3%, for difficult temperament at 12 and 24 months, and greater than 20% for maternal depression at 4 and 24 months. Just less than half of the mothers were classified as having an insecure state of mind with respect to attachment. Approximately one third of the 12 month old infants were classified as

insecurely attached to their mothers. Levels of attachment insecurity in both mothers and infants were in accordance with past studies in low risk populations (Bakermans-Kranenburg & van Izjendoorn, 1993; van Izjendoorn & Kroonenberg, 1988). On average AAI State of mind scale scores were less than 3, with scores of 5 and above warranting consideration for an insecure attachment classification. Strange Situation infant Avoidance and Resistance scale scores were also less than 3 on average, with scores of 5 and above warranting consideration of an insecure infant attachment classification. Levels of toddler internalising and externalising problem behaviours were generally low. Around 10% of toddlers were in the borderline clinical range as per past low risk research (Bayer, Hiscock, Ukoumunne, Price & Wake, 2008; Mathieson & Sanson, 2000; Van Zeijl et al., 2006). Thus the participant characteristics, risk and protective factors, attachment insecurity and levels of toddler problem behaviours were representative of a low risk population.

9.3 Predicting infant attachment anxiety and avoidance from maternal attachment anxiety and avoidance in the context of risk

In accordance with the prototype and compensatory models discussed in chapter four, both direct and inverted paths to infant attachment anxiety and avoidance from maternal attachment and avoidance were hypothesised. This was expected to be over and above the hypothesised effect of parenting stress. Deleted repetitive paragraphs here. Analysis in chapter six tested both longitudinal direct, concordant, and inverted, complementary, pathways empirically using dimensions of attachment anxiety and avoidance in mothers and their twelve month old infants. Repetitive paragraphs deleted here. Findings demonstrated a moderate direct concordant effect from maternal attachment anxiety assessed when the infants were 4 months old to infant attachment anxiety at 12 months of age. Similarly maternal attachment avoidance at 4 months had a moderate effect on infant attachment avoidance at 12 months. Direct pathways between maternal and infant attachment avoidance versus anxiety have been discussed in chapter four as resulting from both shared genetics and social learning mechanisms, such as affect

matching and modeling, involving compromised relationship experiences (Bokhorst et al., 2003; Shah, Fonagy & Strathearn, 2010).

This was the first study to demonstrate direct effects between maternal and infant attachment using attachment dimensions and not classifications. Direct concordant effects of maternal attachment anxiety and avoidance explained approximately 15% of the variance in infant attachment anxiety and 10% of the variance in infant attachment avoidance respectively. Thus there was a positive relation between the two continuous attachment dimensions of attachment anxiety and avoidance in mother and infant, irrespective of levels of security/insecurity. The inverted path from maternal attachment anxiety to infant attachment avoidance just failed to reach significance. The inverted path from maternal attachment avoidance to infant attachment anxiety was not significant.

Thus, meaningful variance in secure levels of attachment anxiety and avoidance was captured in the analyses performed in this study. Analyses provided stronger support for the prototype than the compensatory hypothesis in the study's low risk community sample. Investigation in higher risk samples would provide further information on the conditions of attachment concordance versus inversion. The investigation of potential functional differences arising from the factors of the AAI principal components analysis represented a leap forward in attachment research and will be discussed next.

9.3.1 Effects of maternal attachment strategies of derogation, lack of memory, idealisation, involving anger and passivity

Further analyses indicated functional differences amongst the maternal attachment avoidant strategies. Repetitive sentences deleted here. Maternal AAI Idealisation of mother was a general risk factor for both infant attachment avoidance and anxiety. Derogation of mother and Lack of memory were specifically associated with infant attachment avoidance versus anxiety respectively. The active, rejecting derogation strategy may reflect a mother's harshness and rejection of attachment in her infant which may lead to the development of infant attachment avoidance. The

lack of memory strategy may reflect an implicit rather than an explicit avoidance of attachment related feelings and experiences. This may have the effect of heightening attachment related anxiety in the infant's interaction with their mother as they try to get their needs met by a less than responsive mother. There has been no prior research investigating the effects of individual AAI state of mind scales on dimensions of infant attachment anxiety or avoidance. This study has demonstrated functional differences in mothers' avoidant strategies may differentiate the development of infant attachment anxiety versus avoidance.

None of the AAI SOM scales relating to a mother's relationship with her father were associated with infant attachment avoidance. Thus, this study's results suggested that a mother's state of mind with respect to her attachment relationship with her own mother, and not her father, was more important in determining attachment avoidance in her infant at 12 months. It makes sense that the idealising stance a mother takes particularly to her own mother would have the most impact on her relationship with her own infant. Idealisation of what it means to be a mother is presumed to affect how a mother interacts with her own infant. An infant of an idealising mother may not experience as much rejection of attachment as an infant of a derogating mother and hence may continue to try and use the mother as a secure base. Their efforts however may be ineffective due to their mother's insensitivity to their infant's attachment needs and hence the infant may become frustrated, angry and resistant.

Lack of memory may be viewed as a more neutral avoidant strategy than the openly contemptuous strategy of derogation or the unbalanced emphasis on the positive of idealisation. Lacking conscious access to potentially hurtful or negative events in their past, mothers with elevated lack of memory ignore salient aspects of their attachment experiences. Painful memories may be blocked or perhaps somewhat lacking due to parental neglect, resulting in fewer opportunities for childhood interaction and memory formation. In interaction with their infants these mothers may differ from idealising mothers by being less positive and more

emotionally neutral. They may also lack interaction skills due to impoverished interaction with their own parents in childhood.

Mothers of anxious children have been shown to be intrusive and insensitive and misread or ignore their infant's cues. Although well meaning, interactions with their infant are often unsynchronised and their intensity of interaction may be too high. Perhaps mothers who exhibit a lack of memory with respect to their childhood attachment experiences are also more prone to ignore salient cues in their interactions with others. This may result in mothers with elevated lack of AAI memory being intrusive or insensitive in their interactions with their infant, contributing to the development of infant attachment anxiety. Thus these infants may be less avoidant of their mothers but may be more anxious as they do not receive the support they need. Repetitive sentence deleted here.

There was also a significant negative inverted path from *Derogation of father* to infant attachment anxiety. In this study, derogation with either parent were the lowest of the maternal attachment avoidance SOM scales. Perhaps using low levels of derogation demonstrates an awareness of failings in her own parents which the mother may seek to rectify in her relationship with her own infant. Active derogation of one's own mother may enhance contempt for attachment in a mother's own relationship with her infant. Conversely, derogation of father may enhance sensitive mothering and provide a buffering effect to the development of infant attachment anxiety.

The direct, concordant path from maternal attachment anxiety to infant attachment anxiety was due to both mothers' AAI Passivity of discourse and Involving anger with either parent. Individually however none of the three preoccupied SOM scales were associated with infant attachment avoidance. Thus the inverted path from maternal attachment anxiety to infant attachment avoidance was not due to any particular aspect of attachment preoccupation. Findings from the current study did not suggest functional differences between preoccupied AAI

strategies of passivity of discourse or involving anger and the development of infant attachment anxiety or avoidance.

Deleted repetitive sentence here. Discussion in chapters four and six proposed a compensatory mechanism for the inverted pathways from maternal attachment anxiety to infant attachment avoidance and vice versa. Infants of moderately avoidant mothers have to try harder to get their attention and needs met with varying success. Similarly, infants of moderately anxious mothers may use some avoidance to give them some space from a moderately overprotective or intrusive mother. It was hypothesised attachment inversion may be more likely in low than high risk populations. This was not supported by findings in this study in which inverted pathways explained a trivial amount of variance in infant attachment anxiety and avoidance. There was greater support for concordant than inverted paths to infant attachment anxiety and avoidance from maternal attachment anxiety and avoidance. Deleted sentence here. It is likely prototypical versus compensatory mechanisms are determined both by biological influences, social learning mechanisms and levels of maternal attachment anxiety and avoidance. Perhaps the mother's attachment strategies have to be sufficiently extreme to force her infant consider adopting the opposite attachment strategy.

Adoption of a predominant attachment strategy is presumed to be driven by the appraisal of the availability of the attachment figure to act as a source of comfort and support when needed. Traditionally, attachment anxiety and avoidance have been viewed as opposite strategies. However, perhaps attachment anxiety represents a mid-way point between attachment security and attachment avoidance. Secure infants have confidence in the availability and ability of their caregivers to provide comfort. Infants with elevated attachment avoidance appear to have given up on using the mother-child relationship as a source of regulation. Infants with elevated attachment anxiety are still trying to use the relationship for regulation of their distress and experience frustration with its ineffectiveness. This may have implications for the timing of targeted interventions.

Some of the variance in infant attachment anxiety and avoidance could also stem from the infant's relationship with their father and other significant caregivers. Although there is some classification research involving fathers, future research could also investigate the direct role of fathers compared with mothers in the development of infant attachment anxiety and avoidance.

9.3.2 Exploring the relative roles of maternal attachment and risk in the development of infant attachment anxiety and avoidance

Recent research demonstrating similar rates of maternal-infant attachment concordance between adoptive and foster dyads has also highlighted the importance of rearing environment in the development of infant attachment (Dozier, Stovall, Albus & Bates, 2001). Indeed some researchers have used continuity of rearing environment risk to explain attachment concordance as discussed in chapter four (Belsky & Pasco Fearon, 2008; Dickstein, Seifer & Albus, 2009; Huth-Bocks, Levendosky, Bogat & von Eye, 2004). Rearing environment risk was represented by parenting stress and difficult temperament in this study. In chapters four and six it was hypothesised parenting stress and possibly difficult temperament would partially mediate the relations between maternal and infant attachment anxiety and avoidance.

Meta analysis had demonstrated small to moderate effects of stress on infant attachment security in a variety of populations using a variety of infant attachment measures (Atkinson et al., 2000). This study did not support an effect of parenting stress on infant attachment in accordance with a comparable study by Teti, Gelfand, Messenger and Isabella (1995). Early parenting stress when infants were 4 months old was not associated with either attachment avoidance or anxiety in the infants when they were one year old. This was the case regardless of the source of stress, arising either from within the parent-child relationship, from the mothers' relationships with others or from contextual life event stress. Similarly, maternal attachment anxiety was not associated with infant difficult temperament. Thus findings suggested that in low risk populations the development of infant

attachment anxiety and avoidance was not mediated by parenting stress or infant difficult temperament.

This may have been due partly to the low risk nature of this sample and the relatively low levels of parenting stress and difficult temperament reported by the mothers across the study's two year period from birth to two years. Replication in a high risk sample would help to clarify whether the lack of association between parenting stress and difficult temperament with infant attachment avoidance and anxiety is also present at higher levels of risk. Nonetheless, it is an important finding that at low to moderate levels, neither parenting stress nor infant difficult temperament, seemed to be directly related to the development of infant attachment anxiety and avoidance.

Maternal attachment anxiety however, but not avoidance, was associated with concurrent and subsequent parenting stress. Mothers with elevated attachment anxiety may experience or report more subjective distress, but it cannot be concluded from the current study whether they are physiologically more stressed than mothers with low attachment anxiety. The lack of association between maternal attachment avoidance and self-reported parenting stress was somewhat consistent with the anticipated underreporting of feelings of distress by avoidant mothers (Fortuna & Roisman, 2008; Kobak & Seery, 1988; Mikulincer & Shaver, 2008). A negative association however would have provided stronger support. Use of physiological stress measures such as skin conductance and cortisol levels in addition to self-report measures would help clarify whether there is concordance between self reported subjective and biological stress in mothers with elevated attachment anxiety and avoidance.

9.3.3 Summary

This study has demonstrated infant attachment behaviour, as observed in the Strange Situation paradigm, is determined by factors within the mother-infant relationship that have more to do with the mother's attachment state of mind and emotion regulation strategies than by her perceived feelings of stress or of her

infant's difficult temperament. Past classification AAI analyses obscured more specific associations between forms of mother's attachment avoidance or preoccupation and the development of infant attachment anxiety and avoidance. This study has shown individual maternal attachment strategies have differential associations with the mother-infant attachment relationship.

Direct effects were greater than inverted effects. No direct paths from parenting stress to infant attachment were supported. However given the large amount of unexplained variance, further constructs are needed to explain the development of infant attachment anxiety and avoidance. The roles of maternal and infant dimensions of attachment anxiety and avoidance in predicting parenting stress and toddler problem behaviours will be discussed next.

9.4 Role of attachment in predicting parenting stress and toddler problem behaviours

Attachment research has demonstrated securely attached infants are more likely to be well-adjusted children than insecurely-attached infants (DeKlyen & Greenberg, 2008). However the predominance of small sample sizes in attachment research has prevented the delineation of potentially different developmental outcomes from different attachment strategies (Thompson & Raikes, 2003). This study investigated the efficacy of maternal and infant attachment dimensions of avoidance and anxiety in the prediction of parenting stress when infants were 12 months old and toddler internalising and externalising problem behaviours when infants were two years old.

9.4.1 Predicting parenting stress from maternal and infant attachment anxiety and avoidance

Deleted repetitive sentence here. Empirical analyses in chapter six adopted a longitudinal design to investigate the hypothesised relative contributions of constructs of maternal attachment anxiety and avoidance, maternal depression, difficult temperament and positive and negative marital relations assessed when the

infant was 4 months old and infant attachment anxiety and avoidance simultaneously on maternal reported parenting stress when her infant was 12 months of age. Common and differential pathways to parent-other versus parent-child stress were hypothesised. Difficult temperament was expected to be relatively more influential in the development of parent-child stress. Negative marital relations were expected to impact parent-other stress more than parent-child stress. Maternal depression was expected to be a generic predictor of stress. Possible buffering by positive marital relations was also explored.

The longitudinal design enabled stronger conclusions regarding relations between constructs than those that have been drawn from the mostly concurrent parenting stress research. Maternal attachment anxiety was expected to contribute to parenting stress both directly and indirectly via infant attachment anxiety. Similar effects from maternal attachment avoidance were hypothesised as possible, although it was suggested avoidance may not be associated with parenting stress. These opposing possibilities with respect to attachment avoidance were explored.

Consistent with prior classification research, this study found a small effect of maternal attachment anxiety at 4 months on parenting stress when the infants were 12 months old (Carlson, Sampson & Sroufe, 2003; Diamond & Aspinwall, 2003; Mikulincer & Shaver, 2008). Contrary to expectation however, there was no effect of infant attachment anxiety on either parent-child or parent-other stress. Note that prior studies had reported associations between global attachment security and parenting stress. No prior studies had investigated relations between parenting stress and dimensions of attachment anxiety and avoidance. Thus earlier maternal characteristics, such as attachment anxiety and level of depression, in conjunction with infant difficult temperament, were found to be more influential in the prediction of subsequent self reported parenting stress, than concurrent mother-infant attachment anxiety. It was expected resistant behaviour elicited under conditions of infant distress in the Strange Situation would be related to mothers' parenting stress. However this was not found to be the case. Thus self-reported

parenting stress may reflect more global maternal feelings and be less related to specific infant behaviours in specific situations.

Infants with high attachment anxiety in the Strange Situation at 12 months may represent mother-infant dyads who are struggling to achieve attunement. This may be due to developmental delays that are resolved as the infant matures and the mothers learn more about how to parent her child (Van der Mark, 2002). Alternatively, the disrupted relational synchrony, evident by the infant's resistant behaviour in the Strange Situation, may persist and become increasingly dysfunctional. Increased parenting stress may result as the effects of long term frustration and negative emotions take their toll on both mother and infant. Another possibility may involve the infant giving up on using their relationship with their mother to regulate distress and becoming increasingly avoidant resulting in decreased parenting stress.

Given the likely underreporting, or lack of conscious awareness of parenting stress, expected in mothers with elevated attachment avoidance, maternal attachment and infant avoidance had been expected to be negatively associated with parenting stress (Kobak & Seery, 1988). This study however found no effect of maternal attachment avoidance on parenting stress in either domain. Thus the mother's dismissing strategies associated with attachment avoidance were not related to her subjective experience or reporting of stress. Consistent with expectation however, infant attachment avoidance had a small negative effect on parenting stress in both domains. Avoidant infants tend to ask little of their mothers, presumably for fear of a negative response, and focus their attention on things around them instead (Main, 2000). Thus mothers were found to experience less parenting stress as their infants' attachment avoidance increased. Due to the lack of association between maternal attachment avoidance and parenting stress, there was no support for the mediation of the effect of maternal attachment avoidance on parenting stress by the mother-infant attachment relationship as had been predicted (Belsky, 1984).

As expected, this study demonstrated early difficult temperament was more influential in the development of parent-child than parent-other stress. The effect of difficult temperament on parent-other stress was mediated by maternal depression. Although negative marital relations had a stronger effect on parent-other than parent-child stress as had been predicted, this effect was also mediated by maternal depression. The small effect of negative marital relations on parenting stress in this study's low risk population was consistent with prior research demonstrating effects for high, but not low risk populations (Feeney, Alexander, Noller & Hohaus, 2003). Positive marital relations had no direct effect on parenting stress.

Thus, this study demonstrated common and differential pathways to parent-child versus parent-other stress. In accordance with prior studies maternal factors, such as maternal depression, were more influential than child factors, such as infant difficult temperament, regardless of the type of stress (Belsky, 1984; Crnic, Gaze & Hoffman, 2005; Mulsow, Caldera, Pursley, Reifman & Huston, 2002). Individual factors were more influential than relational factors including maternal and infant attachment and positive and negative marital relations, in determining parenting stress. However maternal attachment anxiety and negative infant attachment avoidance did have small, direct effects on parenting stress in either domain over and above the effect of maternal depression and difficult temperament. There was no direct effect of either positive or negative marital relations on parenting stress in either domain. There was an indirect effect of negative marital relations via maternal depression.

9.4.2 Predicting toddler internalising and externalising problem behaviours from maternal and infant attachment anxiety and avoidance

Problem behaviours were conceptualised in chapter one as self-regulation difficulties likely to have resulted from interactions between constitutional factors including temperament and a child's sensitivity to their environment, quality of early care and exposure to stress (Boyce & Ellis, 2005; Greenberg, Speltz & DeKlyen, 1993; Gunnar & Quevedo, 2007; National Scientific Council on the Developing Child, 2008). Analyses in chapter seven investigated the effects of attachment, maternal, child,

and relationship variables in the context of parenting stress on the development of toddler problem behaviours in a longitudinal design. This addressed a gap highlighted in chapter one of a lack of studies of theoretically driven, integrative empirical models linking infant attachment and normative family stress to specific problem behaviours particularly in infants (McMahon, Grant, Compas, Thurm & Ey, 2003; Dallaire & Weinraub, 2007).

The differential outcome hypothesis purported maternal and infant attachment avoidance led to externalising problem behaviours whereas maternal and infant attachment anxiety led to internalising problem behaviours. Discussion in chapter five hypothesised both attachment anxiety and avoidance could be expected to be associated with either internalising or externalising problem behvaiours. Empirical associations were explored in the regression analyses conducted in chapter seven. Contrary to expectation and prior research, this study found no effect of global maternal attachment avoidance on either internalising or externalising toddler problem behaviours (Crowell, O'Connor, Wollmers, Sprafkin & Rao, 1991). Contrasting results were explained in chapter seven by differences in sample risk, child age, and the use of dimensional versus categorical maternal attachment avoidance.

Consistent with expectation however, specific maternal avoidant attachment strategies involving lack of memory and derogation of her mother however were found to explain a small amount of the variance, around 5%, in toddler externalising problem behaviours. Thus aspects of maternal attachment avoidance were found to predict externalising and not internalising problem behaviours consistent with expectation. Unexpectedly, idealisation of mother was negatively associated with toddler internalising problem behaviours. Thus idealisation of what it means to be a mother was found to act as a protective factor for toddlers' internalising problem behaviours in this study's low risk community sample. Note that analyses captured secure and insecure levels of attachment variance. At low levels idealisation may be a protective factor on the development of internalising problem behaviours that becomes a risk factor at higher, insecure levels of idealisation.

Contrary to prior studies in preschoolers and older children, this study found a small negative effect, explaining less than 5% of the variance, of maternal attachment anxiety on toddler problem behaviours in a low risk population (Cassidy & Berlin, 1994; Costa & Weems, 2005; Cowan, Cohn, Cowan & Pearson, 1996; Dozier, Stivall & Albus, 1999; Meadows, McLanahan & Brooks-Gunn, 2007; Shamir-Essakow, Ungerer & Rapee, 2007). A mother's AAI Passivity of discourse was unrelated to toddler problem behaviours. A negative relation with a mother's AAI Involving anger with her mother explained 13% of the variance in externalising toddler problem behaviours. A negative relation with a mother's AAI Involving anger with her father explained 10% of the variance in toddler internalising problem behaviours.

Thus the current study found involving anger with mother and father were protective factors against externalising and internalising toddler problem behaviours respectively. AAI expression of involving anger was interpreted as reflecting mothers' emotional expression which functioned as a protective factor against toddler problem behaviours in a low risk population. The differential effects of involving anger with mother versus father are difficult to explain and require replication. A mother's anger with her own mother can be expected to affect the way she parents her own child. Presumably she would try and be a different kind of mother from how she perceived her own mother to be. Other factors such as maternal personality and familial risk may determine how effective she is in affecting this intergenerational change in mothering. Nonetheless, this study has demonstrated mothers' conscious lack of endorsement of perceived bad mothering is a protective factor for toddler externalising problem behaviours. This may reflect a rearing environment effect of higher resultant quality of care. Maternal lack of endorsement of perceived bad fathering however was found to be a protective factor against toddler internalising problem behaviours. This may reflect shared protective predispositional factors of mother and infant.

The current study's findings are in contrast to prior low risk research demonstrating concurrent maternal AAI Involving anger as a risk factor for both internalising and externalising problem behaviours in kindergarten and early school aged children (Cowan, Cohn, Cowan & Pearson, 1996). It is possible the relationship between maternal attachment anxiety and child problem behaviours varies with developmental stage. Perhaps mothers express less anger with their children when they are infants compared with when they become preschoolers and older children. Observational measures of parent-child interaction assessing maternal expressed anger across developmental stage would provide clarification. Alternatively, contrasting findings may be due to the use of different problem behaviour measures and parents versus teachers as informants.

Contrary to the widely assumed differential outcome hypothesis, this study found a small direct effect of infant attachment avoidance on toddler internalising and not externalising problem behaviours. Findings were consistent however with other prior research demonstrating an association between attachment avoidance and internalising problem behaviours (Brumariu & Kerns, 2010; Cozolino, 2006; Dallaire & Weinraub, 2007; Pierrehumbert, Miljkovitch, Plancherel, Halfon, & Ansermet, 2000; Wood, McLeod, Sigman, Hwang, & Chu, 2003). This pathway was consistent with elevated attachment avoidance representing overcontrol associated with internalising problem behaviours described in the first chapter (Sroufe, 1983; Cole, Michel & Teti, 1994). Thus the current study's use of attachment dimensions of anxiety and avoidance has revealed a specific relationship between infant attachment avoidance and internalising problem behaviours. This pathway may have been obscured in studies using infant attachment security. Further the small numbers available in most classification attachment research have also failed to demonstrate this relationship.

Also contrary to expectation according to the differential outcome hypothesis, the current low risk study found infant attachment anxiety was a protective factor for the development of toddler internalising problem behaviours (Bogels & Brechman-Toussaint, 2006; Manassis, 2001; Mikulincer & Shaver, 2008). Resistance

displayed by 12 month old infants towards their mothers in the reunion episodes of the Strange Situation purportedly reflects imperfections in mother-infant co-regulation. Nonetheless resistant behaviour indicated the infant is continuing to approach the mother for help with their emotion regulation. Attempted infant use of the mother for co-regulation was associated with subsequently less internalising toddler problem behaviours which are characterised by social withdrawal.

If frustration continues as the toddler develops, he may give up on using his mother for emotion regulation and adopt internalising strategies. This would be consistent with prior research demonstrating associations between insecure classifications of infant attachment resistance and internalising problem behaviours in older children. Alternatively the developing toddler may escalate his calls for help displaying externalising problem behaviours as he gets older. Further longitudinal research investigating the relations between dimensional infant attachment anxiety and problem behaviours in older children in both high and low risk populations would provide clarification.

In contrast to prior studies, the current study did not find infant attachment anxiety and avoidance mediated the effects of maternal attachment anxiety and avoidance on toddler problem behaviours (Cowan, Cowan & Mehta, 2009; Phelps, Belsky & Crnic, 1998). This was possibly due to low power resulting from the small sample size and small associations between maternal and infant attachment anxiety and avoidance and toddler problem behaviours. In the current study, mothers' AAI Lack of memory was associated with infant attachment anxiety and Derogation with infant attachment avoidance. Both Lack of memory and Derogation were also associated with externalising toddler problem behaviours. Thus maternal attachment would appear to have independent effects on infant attachment and the development of toddler problem behaviours.

Attachment strategies are used under conditions of stress and distress when an infant may feel threatened or unsafe. There may be several underlying causes of toddler problem behaviours, only one of which may be a response to feeling

threatened or unsafe. For example mother-toddler conflict may explain externalising problem behaviours whereas feelings of overstimulation and wanting to be left alone or high sensitivity may explain internalising problem behaviours. These explanations are not necessarily associated with feeling unsafe or threatened, the conditions under which attachment strategies are presumed to be activated.

9.4.3 Summary

Maternal attachment anxiety at 4 months had a small positive effect on parenting stress in both domains when infants were 12 months old. Infant attachment avoidance had a small negative effect on both concurrent parent-other and parent-child stress. By comparison, early maternal depression and difficult temperament had moderate to large effects on parenting stress. Neither maternal attachment avoidance nor infant attachment anxiety affected parenting stress. Maternal depression accounted for the effect of negative marital relations on parenting stress. Findings were similar for parenting stress in both domains with the exception of maternal attachment anxiety having a stronger effect on parent-other stress and infant difficult temperament on parent-child stress.

Overall findings in this study did not support the differential outcome hypothesis. Maternal attachment anxiety was found to be a protective factor for toddler problem behaviours, particularly externalising problem behaviours. The prediction of toddler externalising problem behaviours by maternal attachment avoidance provided partial support for the differential outcome hypothesis. Infant attachment avoidance predicted toddler internalising and not externalising problem behaviours. Infant attachment anxiety was found to be a protective factor against problem behaviours, internalising in particular. The current study did not support mediation of the direct effects of maternal attachment on parenting stress or toddler problem behaviours by infant attachment. Thus this study demonstrated small effects of maternal and infant attachment dimensions of anxiety and avoidance on both parenting stress and toddler problem behaviours over and above the effects of maternal depression, difficult temperament and concurrent parenting stress. Findings were interpreted as reflecting the low risk nature of the sample and the

effects of continuous attachment dimensions of anxiety and avoidance at more moderate levels rather than the elevated insecure levels in classification attachment research.

9.5 Predicting toddler problem behaviours from different sources of stress

Parenting stress was presumed to interfere with the development of infant regulation skills resulting in maladaptive strategies such as internalising and externalising problem behaviours (Carter, Briggs-Gowan & Davis, 2004; Cicchetti & Toth, 1991; Deater-Deckard, 2004). Whereas associations between parenting stress and externalising problem behaviours have been reported for infants and preschoolers in high and low risk populations, there have been no studies investigating toddler internalising problem behaviours in a low risk population (Mathiesen & Sanson, 2008; van Zeijl et al., 2006; Williford, Calkins & Keane, 2007).

Findings in this study were consistent with the large body of knowledge that has demonstrated moderate to large effect sizes between mostly concurrent associations of parenting stress and toddlers and preschoolers' internalising and externalising problem behaviours (Abidin, Jenkins & McGaughey, 1992; Costa, Weems, Pellerin & Dalton, 2006; Morgan, Robinson & Aldridge, 2002). The current study investigated hypothesised differential relations with toddler internalising versus externalising problem behaviours from different sources of parenting stress arising from within the mother-child relationship, from within mothers' relationships with others or from situational life event stress described in chapter seven (Coyle, Roggman & Newland, 2002; Grant et al., 2003; McMahon, Grant, Compas, Thurm & Ey, 2003).

Stress arising from dysfunctional parent-child interactions in school aged children was related to internalising but not externalising problem behaviours (Costa, Weems, Pelerin & Dalton, 2006). In accordance with Costa et al., the current study demonstrated stress arising from within the parent-child relationship

explained relatively more variance in both internalising problem behaviours than stress arising from a mother's relationships with others. Thus maternal predisposition to stress regardless of the specific relationships involved may be more related to internalising than externalising problem behaviours. This was interpreted as reflecting strong heritability of internalising problem behaviours. Alternatively it may be that the development of toddler internalising problem behaviours is relatively more affected by parenting stress.

Deleted repetitive sentence here. Both sources of concurrent relationship parenting stress were moderately associated with both internalising and externalising toddler problem behaviours. Additional sources of externalising problem behaviours may reside more in parent-child conflict arising from unshared goals. Although parenting stress explained around 20% of the variance in toddler problem behaviours, there remained significant unexplained variance. Thus factors other than parenting stress are also important in the development of toddler problem behaviours.

Deleted repetitive sentence here. Mothers' perceptions of problem behaviours in their toddlers were unrelated to situational life stress. Life event stress however was more highly associated with fathers' reports of their toddlers' problem behaviours. Hence it would appear the father's relationship with their toddler, and not the mother's, was more affected by more distal situational stress including household changes such as changes in family income, moving house or their partner's return to paid employment. This makes sense from an evolutionary adaptiveness perspective. Particularly during infancy, the primary caregiver's, predominantly the mother's, focus is on the developmental needs of their child whereas the secondary caregiver's, predominantly the father's, role is concerned more with supporting the primary caregiver and providing for the family. Whilst it is acknowledged that shared roles are much more common between mothers and fathers, this study has demonstrated differences in the primary concerns of mothers versus fathers during their child's infancy.

9.5.1 Summary

Parenting relationship stress, whether arising from a mother's relationship with her child or with others, was more associated with internalising than externalising problem behaviours. Stress arising from within the mother-child relationship explained more variance than stress arising from relationships with others. Life event stress was not associated with mother reported toddler problem behaviours. Fathers' perception of problem behaviours in their toddler however was associated with life event stress. Findings were interpreted as reflecting the greater emotional investment of mothers in their relationship with their children during infancy compared with the greater investment in providing for his family by fathers. Greater association of parenting stress with internalising than externalising problem behaviours was interpreted as reflecting shared biology and stress vulnerability. Thus parenting stress in either domain was a risk factor for toddler problem behaviours in both dimensions. Specific child characteristics, such as dispositional vulnerability, and other rearing environment factors such as parenting style, social learning and failed co-regulation due to mothers' inability to achieve shared dyadic states of consciousness with their infants, are likely to add explained variance in toddler problem behaviours.

9.6 Toddlers at generic risk for internalising and externalising problem behaviours

Internalising and externalising problem behaviours often co-occur. However there is currently no etiological model to account for the co-occurrence of internalising and externalising problem behaviours (Gilliom &Shaw, 2004). Deleted repetitive sentence here. Empirical analyses in chapter seven compared prediction of CBCL total toddler problem behaviours with internalising versus externalising problem behaviours to investigate putative different etiology for covarying versus pure forms of problem behaviours (Angold & Costello, 1992; Lilienfeld, 2003). It was hypothesised maternal depression, parenting stress and infant difficult temperament were generic risk factors of toddler problem behaviours. As such they were expected to predict both internalising and externalising problem behaviours.

Consistent with prior studies, these generic risk factors had moderate to large effects on co-occurring toddler internalising and externalising problem behaviours (Keiley, Lofthouse, Dodge, Bates & Pettit, 2003; Oland & Shaw, 2003; Shaw et al., 2001). These factors have been shown to have substantial heritability. Maternal AAI Derogation of mother and Involving anger with father explained an additional 5% of the variance in toddler total problem behaviours. Co-occurring internalising and externalising problem behaviours accounted for the variance explained by parenting stress in total toddler problem behaviours. However parenting stress was still important in explaining internalising problem behaviours over and above the effect of covarying externalising problem behaviours. Covarying internalising problem behaviours explained more variance in toddler externalising problem behaviours than parent-other stress but less than parent-child stress. Thus the moderate effect of covarying problem behaviours was similar to that of parenting stress or difficult temperament.

Research has attributed around two thirds of the variance in child internalising and externalising problem behaviours to genetic factors and around one third to rearing environment risk factors (Jaffee, Moffitt, Caspi, Taylor & Arseneault, 2002; O'Connor et al., 2003). The current study found around 20% shared variance between toddler internalising and externalising problem behaviours, presumably reflecting generic risk or common underlying etiology. Co-occurrence purportedly reflected a more general early compromise that may become more specific with development (Nottlemann & Jensen, 1995). Thus co-occurrence rates may vary with developmental stage. Higher covariation of internalising and externalising problem behaviours in toddlers in this study compared with older children supportsed the differentiation with development hypothesis (r=.49 versus r=.35; Jaffee, Moffitt, Caspi, Taylor & Arseneault, 2002). Perhaps differentiation does not occur fully until the final major developmental growth spurt and brain reorganisation that occurs during adolescence. Covariation of internalising and externalising problem

behaviours however continues to exist across developmental stages suggesting at least some common etiology.

One study demonstrated harsh parenting and lack of warmth differentiated adolescents with co-occurring conduct and depressive symptoms from adolescents with either symptom alone (Ge, Best, Conger & Simons, 1996). Perhaps covariation reflected the contribution of rearing environment risk whereas pure symptomatology was determined more by biological vulnerability. The explanation for co-occurring problem behaviours however is unlikely to be this clear cut. Other researchers have suggested co-occurrence represented more severe compromise potentially associated with a cascade arising from failure to meet early socioemotional developmental milestones (Oland & Shaw, 2003). Person-centred studies such as those conducted by Eisenberg and colleagues (Eisenberg et al., 2010) are better placed to answer questions of associations between co-occurrence and degree of compromise. This will be discussed in the next section of this chapter.

9.6.1 Summary

Consistent with prior studies, the current study found substantial covariation between toddler internalising and externalising problem behaviours. Results were interpreted as reflecting rearing environment risk or common temperamental vulnerability. Problem behaviours in one dimension explained a moderate amount of variance in the other similar to the effects of other risk factors such as parenting stress and difficult temperament. Decreased covariation with age would support the proposed differentiation of problem behaviours with development. Stability of covariation across developmental stage may be consistent with increased dispositional and continued rearing environment risk. Clarification of potential explanations of covariation of internalising and externalising problem behaviours across development awaits further research.

9.7 The prediction of toddler problem behaviours from risk trajectories across infancy

9.7.1 Parenting stress trajectories across infancy

Empirical analyses in chapter eight investigated the course of parenting stress across infancy addressing a gap in the parenting stress literature highlighted in chapter three. It was hypothesised at least two trajectories would exist across infancy. Around 10% of mothers were expected to form an *elevated* parent stress trajectory in accordance with prior research conducted with mothers of older children. The course of parent-child versus parent-other stress across infancy was expected to differ. Whereas parent-child stress was expected to follow a u-shaped trajectory, parent-other stress was expected to remain fairly stable across the first two years of an infant's life.

Two trajectories, *low* (84%) and *elevated* (16%), were found to describe parenting stress arising from a mother's relationships with others (parent-other), across infancy from 4 to 24 months in the current study's low risk population. Similarly, there were two trajectories, *low* (76%) and *elevated* (24%), across infancy of a mother's parenting stress arising from her relationship with her child (parent-child). On average, both parent-other and parent-child stress decreased slightly across infancy in both trajectories, mostly due to the decrease in maternal reported stress from 4 to 12 months. Mothers in the *elevated* stress trajectories remained at or above the 85th percentile across infancy. Thus contrary to expectation, the course of parent-other and parent-child was similar being fairly stable across infancy. However relatively more mothers had elevated stress across infancy due to their relationship with their child than due to their relationships with others. This has been interpreted as reflecting early difficulties associated with establishing the mother-infant relationship, infant rhythmicity and sleeping patterns.

Prior low risk research has reported three parenting daily hassles stress trajectories, high (13%), low (65%) and fluctuating (22%), in mothers across the preschool period (Crnic, Gaze & Hoffman, 2005). Chang and Fine (2007) reported three parenting stress trajectories, high (7%), increasing (10%) and decreasing (83%) across toddlerhood, from 14 to 36 months, in a high risk sample of 580 teenage mothers. Thus the current study's relative proportions of high and low stressed mothers were similar to those in the studies described above. Sample differences in risk, age of children, size, stress measures and data analyses may account for variation in proportions and number of trajectories across the studies. For example in the preschool study mothers were placed in forced "high", above the 70th percentile, or "low", below the 70th percentile, stress classes at each time point and class membership across the study period compared (Crnic, Gaze & Hoffmann, 2005). Linear trajectories in the current and Chang and Fine (2007) studies were extracted from patterns in the parenting stress data using latent growth mixture modeling (Muthen & Muthen, 2006). Findings from the current study have shown that whilst most mothers have low parenting stress levels across infancy, there is a group of mothers, around one fifth, who are experiencing elevated parenting stress, in one or both domains, during infancy.

9.7.2 Social emotional difficulty trajectories across infancy

Chapter one reviewed research involving children aged 18 months and upwards reporting three or more risk profiles in populations of either high risk or older children (Degnan, Calkins & Keane, 2008; Feng, Shaw & Silk, 2008; Gilliom & Shaw, 2004; Hill, Degnan, Calkins & Keane, 2006; Moffitt, 1993; NICHD, 2004; Shaw, Gilliom, Ingoldsby & Nagin, 2003; Shaw, Lacourse & Nagin, 2005; Wadsworth, Hudziak, Heath & Achenbach, 2001).These studies demonstrated profiles of risk were already established by the time children were two years old involving less than 10% of children from age two upwards with clinically significant levels of problem behaviours (Biringen, Emde, Campos & Applebaum, 1995; Campbell, Shaw & Gilliom, 2000; Gilliom & Shaw, 2004; Mathiesen & Sanson, 2000). Developmental precursors may be evident in infancy or early emerging problem behaviours may manifest in a different form from later observable internalising or externalising behaviours.

This study investigated the course global social emotional difficulty across infancy. Social emotional difficulty included difficulties in regulation involving feeding, sleeping, and prolonged crying and a lack of pleasure in social engagement. From prior research it was expected at least infants would be described by at least two trajectories of social emotional difficulty across their first two years. Latent growth analyses conducted in chapter eight described two trajectories of *low* (88%), and *at risk* (12%), social emotional difficulty across infancy. Prior studies described above have reported three or more trajectories in samples of older children or high risk infants. Findings in the current study were interpreted as being due to due both the relatively undifferentiated nature of infant symptom expression and the low levels of problem behaviours demonstrated in low risk populations. Trajectory membership was determined largely by early difficulties present when infants were just 4 months old. Thus this study has demonstrated *at risk* infants can be identified in the first two years of life, possibly as early as 4 months of age.

On average social emotional difficulty was uniformly low and well below the ASQ:SE referral threshold for infants in the *low* trajectory. Infants in the *at risk* trajectory had elevated levels of social emotional difficulty at 4 and 12 months, above and around the referral threshold respectively and significantly higher than infants in the *low* trajectory. However by 24 months of age, *at risk* infants' social emotional difficulty was below the referral threshold and did not differ from that of the *low* infants. Further longitudinal research would clarify whether social emotional difficulties trajectories diverged again after toddlerhood. It was possible the current trajectories were biased by sleeping and feeding difficulties characteristically experienced by some mother-infant dyads in early infancy that may not be precursors on ongoing mental health difficulties.

9.7.3 Concordance of parenting stress and social emotional difficulty risk profiles across infancy

Given the strong association between parenting stress and social emotional difficulty reported in the literature, mothers and infants were expected to belong in concordant trajectories and have similar profiles of risk. Findings were consistent with expectation. Most mothers, at least four fifths, in the *low* parenting stress trajectories also had infants in the *low* social emotional trajectory. Concordance was lower in the elevated trajectories however with less than one third of *at risk* infants having mothers with elevated parenting stress. Deleted two repetitive results paragraphs here. The current study demonstrated similar risk profiles including maternal, child and relationship risk factors for parenting stress and social emotional difficulty trajectories across infancy.

Maternal depression, negative marital relations and infant difficult temperament differentiated infants *at risk* and *low risk* for social emotional difficulty and mothers with *elevated* versus *low* parenting stress. Other aspects of a mother's personality and relationship tendencies, represented by maternal attachment anxiety and avoidance, were found to be important in differentiating parent-other stress trajectories but not infant social emotional difficulty or parent-child stress trajectories. Somewhat surprisingly, neither infant social emotional difficulty nor parenting stress trajectories were differentiated by infant attachment anxiety or avoidance. This was consistent with findings from the variable-centred analyses in chapter six of trivial to small effects of continuous dimensions of infant attachment and avoidance on parenting stress. Thus whilst continuous attachment dimensions potentially have greater utility for investigating developmental mechanisms, attachment insecurity may reflect greater overall developmental risk.

9.7.4 Prediction of toddler internalising, externalising and total problem behaviours from parenting stress and social emotional difficulty trajectories

It was expected mothers and infants in the high stress and difficulty trajectories respectively would be associated with higher levels of toddler internalising and externalising problem behaviours. Empirical analyses in chapter eight demonstrated trajectories of early maternal parenting stress and infant social emotional difficulty across infancy predicted significant differences in mother reported toddler CBCL internalising and total problem behaviours at two years of age. Relative differences in average levels of externalising problem behaviours between *elevated* and *low* stress and social emotional difficulty trajectories were smaller than those for internalising and total problem behaviours and did not reach significance. This may be partly due to normative externalising problem behaviours associated with the toddler developmental period. Thus, profiles of parenting stress and infant social emotional difficulty across infancy, starting from as early as 4 months of age, predicted toddler problem behaviours.

Most prior research has investigated either internalising or externalising problem behaviours, but rarely both in the same study. This has not helped advance the co-occurrence knowledge. In the current study, latent class analysis of toddler internalising and externalising problem behaviours identified one toddler (2%), with dominant borderline clinical internalising problem behaviours. Around one quarter of the toddlers were classed according to their elevated subclinical externalising attention problems and aggressive behaviour. The remaining three quarters of the toddlers had low levels of both internalising and externalising problem behaviours. The internalising toddler had higher levels of externalising problem behaviours than the toddlers with low problems. Similarly, the elevated externalising toddlers had higher levels of internalising symptoms than toddlers with low problem behaviours. Thus findings partially support the proposition that co-occurring internalising and externalising problem behaviours represent more severe compromise (Nottlemann & Jensen, 1995; Oland & Shaw, 2005).

However the CBCL toddler problem behaviour classes did not differentiate toddlers with pure versus covarying problem behaviours in contrast to prior research with school aged children (Keiley, Lofthouse, Bates, Dodge & Pettit, 2003). Keiley et al. forced the pure versus covariation factors using confirmatory factor analysis. Differences in sample size, developmental stage and data analysis techniques may explain the lack of pure symptom classes in the current study. Confounding due to normative externalising problem behaviours associated with the toddler developmental period however may also preclude extraction of pure versus covarying classes. Alternatively, it may reflect the relatively undifferentiated nature of problem behaviours in toddlers versus older children. In particular, emotional reactivity, a CBCL internalising scale, may be a generic risk factor for toddler problem behaviours that becomes more specific to internalising problem behaviours with increased differentiation and brain maturation. Further longitudinal research in larger population based samples would provide clarification.

9.7.5 Summary

Empirical person-centred analyses conducted in chapter eight demonstrated stressed mothers and infants with social emotional difficulties tended to go together, and represented *at risk* mother-infant dyads. Profiles of risk were established by the first assessment when infants were just 4 months old. Risk factors associated with *elevated* parenting stress and *at risk* social emotional difficulty included maternal depression, infant difficult temperament and negative marital relations. Most toddlers, three quarters of the sample, had low internalising and externalising problem behaviours. Around one quarter of the sample of 47 toddlers had elevated subclinical externalising with some internalising problem behaviours. Latent class analysis did not distinguish between toddlers with pure versus covarying problem behaviours. Toddlers in a*t risk* dyads had higher levels of internalising, externalising and total problem behaviours.

9.8 Transactions in the development of infant attachment, parenting stress and toddler problem behaviours

Chapter one acknowledged the development of toddler internalising and externalising problem behaviours was likely to involve both moderating and mediating pathways amongst maternal and infant characteristics, mothers' relationships with their infant and others, including their spouse and their own parents, and other aspects of the rearing environment such as parenting stress (Belsky, 2005; Campbell, Gilliom & Shaw, 2000; Collins, Macoby, Steinberg, Hetherington & Bornstein, 2000). Risk factors are likely to be intertwined with relationships involving reciprocal, feed forward and feedback effects (Guttmann-Steinmetz & Crowell, 2006; Wamboldt & Reiss, 2006). The three empirical analyses conducted in this thesis captured some of these relationships as they unfolded throughout infancy and thus addressed criticism of prior research for its lack of consideration of bidirectional, transactional and multiplicative models (Bogels & Brechman-Toussaint, 2006; Cook, 2003; Greenberg, Speltz & DeKlyen, 1993; Thompson & Raikes, 2003).

Parenting stress was conceptualised as a key organising construct for thr development of toddler problem behaviours. Path analysis in chapter six demonstrated feed forward effects of early difficult temperament, maternal depression and maternal attachment anxiety on parenting stress. Repetitive sentences deleted here. From the empirical person-centred analyses conducted in chapter eight mothers with elevated parenting stress across infancy were shown to have toddlers with higher levels of problem behaviours. Concordance between parenting stress and infant social emotional difficulty trajectories demonstrated the interactions between rearing environment risk and social emotional adjustment across infancy.

The widely documented detrimental effects of maternal depression and infant difficult temperament on both parenting stress and toddler internalising and externalising problem behaviours were replicated in regression analyses conducted

in chapters six and seven. Deleted repetitive sentence here. Concurrent rearing environment risk, represented in this study by parenting stress, partially mediated these direct effects on toddler problem behaviours. Thus both maternal and infant characteristics and rearing environment risk were shown to be important in the development of toddler internalising and externalising problem behaviours consistent with prior research (Cote et al., 2009; DeKlyen & Greenberg, 2008; van Zeijl et al., 2006). Analyses revealed specific relations amongst constructs. For example, parenting stress directly affected toddler problem behaviours but not infant attachment anxiety or avoidance. Similarly, difficult temperament affected both toddler problem behaviours and infant attachment anxiety but not infant attachment avoidance. However together, the analyses conducted in the three empiricial chapters demonstrated feed forward effects and interactions across infancy amongst constructs of maternal attachment, depression, and parenting stress and infant difficult temperament and social emotional difficulty.

Contrary to expectation, effects of the three primary relationships, mother-infant, mother-spouse and mother-own parents on toddler problem behaviours were relatively minor. From the integrated findings across chapters six, seven and eight, it can be concluded maternal attachment anxiety was a pervasive risk factor affecting infant attachment, parenting stress and toddler internalising and externalising problem behaviours. Infant attachment avoidance was shown to directly affect toddler internalising but not externalising problem behaviours whilst also reducing parenting stress. Negative marital relations had a minor influence on both toddler and maternal outcomes across infancy via its effect on maternal depression.

It is widely accepted the effects of early experience on development are moderated by later experience (Belsky & Pasco Fearon, 2002). In the current study interactions between concurrent rearing environment risk, represented by parenting stress, and early risk factors were found to affect the development of internalising and externalising problem behaviours differently. Externalising problem behaviours were affected by interactions between parenting stress and maternal depression,

social emotional difficulty and positive marital relations. Internalising problem behaviours on the other hand were affected by interactions between parenting stress and difficult temperament, maternal attachment anxiety and infant attachment avoidance. Temperamentally difficult infants were expected to be more susceptible to the detrimental effects of a stressful rearing environment (Boyce & Ellis, 2005; Guttmann & Crowell, 2006). The current study supported toddlers' differential susceptibility to parenting stress for the development of internalising, but not externalising problem behaviours, consistent with Bogels and Brechman-Toussaint (2006).

Deleted repetitive paragraph here.

9.8.1 Summary

The current study has addressed limitations in prior infant adjustment studies highlighted in the literature review chapters. Direct, mediated and moderated pathways to toddler internalising versus externalising problem behaviours were demonstrated from interactions amongst difficult temperament, infant attachment and parenting stress across the first two years of life. Parenting stress, difficult temperament and maternal depression were shown to be interrelated with one another and were generic predictors of both internalising and externalising toddler problem behaviours. Concurrent parenting stress partially mediated effects of early risk factors. Interactions amongst early and concurrent risk factors explained additional variance in toddler problem behaviours. Apart from maternal attachment anxiety and infant attachment avoidance, relationship variables of maternal and infant attachment and marital relations had relatively minor effects on toddler problem behaviours.

9.9 Limitations

9.9.1 Mother and infant participants

Findings in the current study are limited to low risk, middle class, educated, predominantly Anglo Australian, mother-infant dyads. Risk factors may vary for clinical versus subclinical problem behaviours, in higher risk or more culturally diverse populations. Prior studies have demonstrated higher levels of externalising

problem behaviours in samples of higher socioeconomic risk (Achenbach & Rescorla, 2000; Koot, van den Oord, Verhulst & Boomsma, 1997). Although none of the background variables of maternal age, education, family income, mother-infant separation or infant gender were found to affect toddler problem behaviours in the current study, families with high socioeconomic risk were underrepresented, as were families from culturally diverse backgrounds. Cultural differences are expected to affect parental socialisation and interpretation of toddler behaviours (Bogels & Brechman-Toussaint, 2006). Small to medium cross cultural effect sizes in problem behaviours have been demonstrated in school aged children, however developmental trends were found to be similar across Asian, European, American and Australian cultures (Crijnen, Achenbach & Verhulst, 1999).

Thus no conclusions could be drawn from the current study with respect to the effects of cultural differences or socioeconomic risk on the development of infant attachment, parenting stress or toddler problem behaviours. Findings may be limited to the mother-infant dyads in this sample or to low risk populations in general. Findings may also be specific to infancy. Further studies in more diverse samples are needed to investigate the generalisability of relations amongst maternal and infant attachment, positive and negative marital relations, parenting stress, maternal depression, difficult temperament and problem behaviours found in the current study.

9.9.2 Constructs and study design

There were several limitations to findings in the current study resulting from a reliance on maternal report measures, an absence of observed parenting behaviour across contexts in which their toddlers display problem behaviours, a restricted sample size and limited number of assessments. Shared method variance and construct overlap were likely to have overestimated the relations amongst maternal reported measures of parenting stress, difficult temperament, maternal depression, marital relations and toddler problem behaviours. Thus findings in the current study may have underestimated the relative roles of maternal and infant attachment anxiety and avoidance on both parenting stress and the development of toddler

problem behaviours. Further there is greater content overlap between CBCL problem behaviours and the PSI child domain than the parent domain. Thus the stronger relationship observed between toddler problem behaviours and stress arising from within the mother-toddler relationship may be an artifact of greater construct overlap. Observational measures from multiple informants would have reduced the shared method variance and provided a more accurate reflection of relationships amongst constructs.

Apart from the attachment variables, measures in the current study were provided by maternal report, although fathers also completed the CBCL toddler problem behaviour measure. Limited study resources precluded the adoption of the preferable multi-method, multi-informant research design which would have reduced shared method variance. Other informants could have included other adults who knew the infant fairly well such as professional childminders, grandparents or close friends. Thus measures of infant temperament, parenting stress, marital relations and maternal depression in the current study represented the mother's perception. Shared method variance may reflect mothers' tendency to notice and/or report difficulties across maternal, child and relationship domains. However consistency of relations across mother versus father reported problem behaviours with risk factors validated mothers' perception as providing a reasonably accurate representation of their toddlers' behaviour.

Findings in the current study were also limited by the lack of an observational measure of parenting behaviour. Parenting behaviour has been found to account for the variance in preschoolers' internalising problem behaviours explained by parenting stress, anxiety and depression (Bayer, Sanson & Hemphill, 2009). In the current study parenting behaviour was assumed to be related to both parenting stress and the mother-infant attachment relationship. The Strange Situation videos could be used to provide observed maternal parenting behaviour in a stressful situation. Maternal behaviour in the home environment, where the majority of mother-infant interaction is presumed to occur in the first two years, could be measured using instruments such as the HOME Inventory (Caldwell & Bradley, 2003),

the DPICS-R (Dyadic parent-child interactive coding system-revised; Robinson & Eyberg, 1981; Webster-Stratton, 1989), or the EPCS (Early parenting coding system, Winslow, Shaw, Bruns & Kiebler, 1995).

Contrary to expectation, the current study found infant Strange Situation resistance was not associated with either concurrent parenting stress or toddler problem behaviours. The relative lack of variability of resistance scores may have reduced power to detect small effects. However effects were demonstrated with another low variability scale, AAI derogation of mother. Thus it was concluded low variability did not explain the lack of associations. The current study demonstrated resistant behaviour due to temperamental difficulty arising from uncooperativeness/ unmanageability in day to day, and not just stressful situations, was a more cogent predictor of parenting stress and toddler problem behaviours.

The study's sample size was insufficient to test hypothesised relations simultaneously using structural equation modeling. A single analysis in a three wave longitudinal design would have required a very large sample that was beyond the scope of this project. Instead, paths to infant attachment and parenting stress when infants were aged 12 months were estimated using path analyses, with which there are some limitations. Path analysis assumes perfect measurement and, unlike structural equation modeling, does not take measurement error into account (MacCullum, Browne & Sugawara, 1996). Thus path coefficients may have been over or underestimated due to measurement error. Path analysis also assumes continuous interval, normally distributed measures, uncorrelated residuals with zero mean and homogeneous variance. However analyses have been shown to be relatively unaffected by minor departures from these assumptions (Streiner, 2005). A larger ratio of participants to parameters around 20, rather than 5 to 10 available in the current study, may have provided more robust parameter estimates (Stage, Carter & Nora, 2004).

Estimation of path coefficients is also particularly sensitive to included and excluded paths. Omitted paths may have resulted in biased path estimates.

Relatedly, there are likely to be multiple models that explain the data equally well. However, the models in the current study have been hypothesised from an integration of the parenting, attachment and temperament literature and have theoretical and empirical validity. Finally the current study investigated linear relations only. It is possible that curvilinear or other relations not investigated in the current study provide a closer approximation of the relationships amongst some constructs.

The study's moderate sample size, which was significantly reduced when infants were 24 months old, prevented testing of all hypothesised paths simultaneously in a developmental cascade model, including autoregressive effects (Cole & Maxwell, 2003). Observed stability of constructs across infancy supported a parsimonious model that excluded autoregression effects of repeated measures. Thus the prediction of toddler problem behaviours using the concurrent parenting stress measure represented the net effect of earlier and concurrent parenting stress. Some researchers have used change scores to control for earlier levels of risk factors (Bayer, Hiscock, Ukoumunne, Price & Wake, 2009). Others have partialled out shared variance using regression residuals (Putnam & Stifter, 2005).

Person-centred analyses used data imputation methods, particularly for missing 24 month data, which may have limited the number of classes and trajectories extracted. However given demonstrated similarities between participants and non-participants at 24 months, it is unlikely substantive differences resulted. Rather findings were more likely to be limited by the modest sample size overall and relative homogeneity of the sample. Limited power, due to the small sample size when infants were 24 months old, also prevented CBCL subscale analyses. This may be particularly important for the delineation of shared factors between covarying internalising and externalising toddler problem behaviours.

An additional time point when infants were aged six months would have enabled full three wave data to fully test mediation and moderation relationships in the prediction of mothers' parenting stress at twelve months. Future research could

extend this study to include multiple measures of infant attachment at 12, 18 and 24 months to further delineate temporal sequences amongst the attachment, parenting and temperament constructs. Instead, a series of half longitudinal designs containing a mixture of prior and concurrent constructs were used to investigate the longitudinal hypotheses in the current study. This represented a compromised position within resource constraints.

The longitudinal analyses conducted in the current study provided support for temporal sequences amongst maternal and infant attachment, parenting stress, difficult temperament and toddler problem behaviours. Causality however cannot be concluded from a temporal sequence alone. The current study design was observational and did not include experimental manipulation or a controlled intervention required to provide stronger support of causality. Further, observed relationships may be due to other mediating variables or correlated variables that were not included in the model as indicated by the substantial unexplained variance in infant attachment, parenting stress and toddler internalising and externalising problem behaviours (MacCallum & Austin, 2000).

9.10 Implications and directions for future research

9.10.1 Research on problem behaviours

Sameroff and McKenzie (2003) have noted that study designs need to try and incorporate the effects of the development of all constructs in order to more closely approximate what is happening in the real world over time. Developmental cascade models control for across time stability of constructs and within time covariation amongst constructs in accordance with transactional models of development (Bell, 1979; Cicchetti, 1990; Masten et al., 2005; Sameroff & Seiffer, 1983; Sameroff & Mackenzie, 2003). For example, Gross and colleagues (Gross, Shaw, Moilanen, Dishion, & Wilson, 2008; Gross, Shaw, Burwell & Nagin, 2009), have demonstrated ongoing reciprocal effects of child internalising and externalising disruptive behaviours and maternal depression from toddlerhood. However detecting effects of variables over and above the effects of construct continuity has proved difficult due

to the reduced residual variance after construct stability has been taken into account (Eisenberg & Valiente, 2004; Eisenberg et al., 2010). Thus although developmental cascade models may more closely approximate the transactional nature of development, reduced statistical power may obscure meaningful findings.

Observed toddler behaviour is presumed to be multiply determined by factors such as physiology and biological disposition, attachment strategies, and aspects of caregiving and the rearing environment (Vondra, Shaw, Swearingen, Cohen & Owens, 2001). The current study has considered the effects of some maternal, child and relationship factors presumed to be important in the development of toddler problem behaviours. Factors were identified from the theoretical and empirical literature as having the potential to clarify developmental pathways. However the significant amount of unexplained variance in the current study points to additional explanatory constructs from both aspects of parent personality and behaviour and infant temperament.

The current study investigated the effects of global aspects of difficult temperament including unadaptability/ unapproachability, uncooperativeness/ unmanageability and irritability on the development of toddler problem behaviours. These global constructs were found to be associated with both internalising and externalising problem behaviours. There is a large body of existing research linking more specific aspects of temperament with internalising versus externalising problem behaviours (Sanson, Hemphill & Smart, 2004). Polarisation of temperament constructs however does not contribute to further understanding of co-occurring internalising and externalising problem behaviours. It is possible interactions amongst aspects of infant temperament such as emotionality, attention and arousal regulation and inhibition may differentiate between pure versus co-occurring trajectories (Eisenberg et al., 2009). Research has also begun using finer aspects of infant difficult temperament including neurophysiological measures of inhibition and negative emotionality (Fox & Hane, 2008).

Whilst an infant may be born with a temperamental vulnerability to regulation and control difficulties, research has demonstrated substantial rearing environment effects in the development of problem behaviours. For example, effortful control is an executive self regulation function developing towards the end of the first year involving attention and inhibitory control skills and has been associated with low levels of problem behaviours (Putnam & Stifter, 2005). Eisenberg et al., (2010) observed that there was little research investigating the effects of non-supportive mothering on toddlers. Effortful control deficits, which may underlie problem behaviours in toddlers and preschool children, have been shown to be caused in part by nonsupportive mothering lacking in warmth and sensitivity (Eisenberg et al.).

Increased knowledge of parenting effects, particularly in infancy, would inform the development of early interventions to ameliorate the effects of genetic risk. Additional parenting constructs worthy of consideration include the role of co-parenting and family cohesion in the development of toddler problem behaviours (Bogels & Brechman-Toussaint, 2006; Dickstein, Seifer & Albus, 2009; Park, Belsky, Putnam & Crnic, 1997). Discordance in mothers' and fathers' parenting strategies has been linked to both internalising and externalising problem behaviours in older children (Bogels & Brechman-Toussaint). To some extent aspects of co-parenting were represented in the current study by parent-other stress and marital relations.

The current study hypothesised infant attachment, representing the emotional quality of the parent-infant relationship, would predict toddler problem behaviours. However only a small effect was found for the effect of infant attachment avoidance on toddler internalising problem behaviours. Parent acceptance-rejection is a related construct (Rohner, 1990). According to Rohner, parent acceptance-rejection represents one dimension of the emotional aspect of the parent-child relationship. The other important dimension involves warmth and parent control. Together, global constructs of parental warmth, control and acceptance-rejection may help to explain rearing environment effects on the development of problem behaviours.

Mechanisms of influence of parents on child development include shared genetics, differences in parenting style, autonomy support, maternal modeling of attention and emotion processing, and socialisation (Spence, Najman, Bor, O'Callaghan & Williams, 2002). More specific aspects of parenting behaviour such as enmeshment, overcontrol and negativity have the potential to clarify mechanisms in the development of problem behaviours beyond the accepted global detrimental effects of parenting stress. Thus whilst this study found difficult temperament and maternal attachment anxiety contributed to parenting stress, other mechanisms of parenting influence, such as emotional availability and affect sharing, supporting autonomy and socialisation, may have greater explanatory utility in the development of internalising versus externalising problem behaviours in toddlers.

The current study utilised the AAI state of mind scores to represent maternal attachment dimensions of anxiety and avoidance. Small effects of maternal attachment anxiety and avoidance were found on parenting stress and toddler problem behaviours and moderate effects on infant attachment. How a mother presents her childhood attachment narrative may not accurately represent her emotion regulation capabilities or accurately predict how she interacts with her child. Relevant observational measures and their association with AAI state of mind scales would increase knowledge of the mechanisms underlying the presumed influence of maternal attachment on the mother-infant relationship. Other maternal, infant and mother-infant relationship characteristics are required to explain additional variance in infant attachment and avoidance. For example maternal expressed emotion, such as self and child criticism, has been shown to be associated with attachment insecurity and disorganisation (Gravener et al., 2012).

The observed association between maternal derogation and infant attachment avoidance in this study may possibly be explained by maternal negative expressed emotion. Maternal overprotection as well as rejection and neglect have been identified as risk factors fostering either overdependency and immaturity or compulsive self-reliance which are likely to be associated with infant attachment anxiety and avoidance respectively. Measures that assess a mother's

developmentally appropriate acceptance and nurturance of her infant's increasing autonomy may help to explain the development of infant attachment anxiety and avoidance and toddler problem behaviours. Observational measures assessing micro aspects of the affective quality of parent-infant interaction in the first twelve months such as affect attunement may also shed further light on the development of infant attachment anxiety and avoidance and toddler problem behaviours (Van Ijzendoorn, 1995).

Although conceptually linked to and generally concordant with the AAI State of mind scales, the *Probable experience* scales have rarely been used in research. It may be that the actual experiences a mother had in her own childhood have independent effects on her behaviour in close relationships from her current state of mind with respect to attachment and may add unique variance to the prediction of infant attachment and toddler problem behaviours. Perhaps the AAI *Probable experience* scales have independent associations with emotion regulation and interactional tendencies. Thus investigations including the AAI *Probable experience* scales are warranted. In a recent study, Dickstein, Seifer and Albus (2009) reported the AAI probable experience *Loving* scale, which represents the experience of feeling loved supported and worthy by one's parents in childhood, was consistently related to all aspects of couple and family function. However the *Loving* scale does not differentiate between attachment anxiety and avoidance. The *Involving* parent probable experience scales are expected to be related to attachment anxiety and the *Rejecting* and *Neglecting* scales to attachment avoidance.

Some adults however have been shown to be secure with respected to attachment despite experiencing a negative childhood. Future research should also follow Roisman and colleagues' in the consideration of potential dissociated effects between the probable experience and state of mind scales, such as is seen in the "earned secure" mothers (Roisman, Padrón, Sroufe, & Egeland, 2002). These investigations have cogent potential to explain resilience factors and direct intervention designs. Attachment discontinuity has been associated with significant life events (Lewis, Feiring, & Rosenthal, 2000; Thompson & Raikes, 2003; Weinfeld,

Sroufe, & Egeland, 2000). Thus a mother's state of mind with respect to attachment may be more likely to be reorganised following the significant event involving the birth of her child. A mother's current state of mind with respect to attachment has been shown to be an important determinant of the quality of her current interpersonal relationships, including those with her spouse and with her child (Main, 2000). The birth of a child is a significant potential intervention point where mothers may be more open to interventions aimed at increasing their attachment security and improving relations with their infant. Whereas research has studied attachment discontinuity across the transition to marriage there has been little emphasis on the transition to parenthood.

Toddlers' average social emotional difficulty did not differ across the *low* and *at risk* trajectories. This suggested social emotional difficulties at 24 months of age were relatively unrelated to feeding and sleeping difficulties experienced during the first year of life. Thus early difficulties in infancy may not be as important to later social-emotional health as indicated by the findings in this study. Further longitudinal research tracking infants' social emotional difficulty from birth is required to determine whether the trajectories diverge again into preschool and beyond.

Factor analysis in the current sample indicated CBCL scales in the small low risk toddler sample were not clearly defined into an internalising versus an externalising factor. Scales loaded onto two factors one of which had high loadings from the *emotionally reactive* internalising scale and the externalising *attention problems* and *aggressive behaviour* scales. Thus the *emotionally reactive* scale may reflect general and not specific internalising vulnerability. This factor also had moderate loadings from the internalising *anxious/depressed*, *somatic complaints* and *withdrawn* scales. Thus the first factor was a mixture of internalising and externalising scales. The *withdrawn* and negative *anxious/depressed* scales had the highest loadings on the second factor.

Given the mixed findings with respect to differentiation between the internalising and externalising CBCL scales, it is not surprising pure classes were not

identified in the latent class analysis of the CBCL scales. Further research on pure versus covarying problem behaviours could consider using residuals, after shared variance has been removed, as per Putnam & Stifter (2005). Prediction of behaviours in individual CBCL scales in a large population-based sample would also inform etiology of different types of problem behaviours. As noted in the previous discussion of the current study's limitations, the small, low risk sample in the current study precluded finer subscale analyses.

Research has demonstrated intergenerational transmission of problem behaviours (Hammen, Shih & Brennan, 2004; Jaffee et al., 2006). Intergenerational transmission mechanisms include shared genetics, maladaptive parenting such as harsh and inconsistent discipline, maternal psychopathology and contextual stress. Thus further research could include measures of parent problem behaviours, observed parenting including micro aspects of the affective quality of the parent-child relationship and other aspects of maternal personality.

Recently research in a small high risk sample reported parental avoidant personality was associated with externalising but not internalising problem behaviours in children and adolescents (Bertino, Connell & Lewis, 2012). High negative maternal control and harsh discipline have been associated with internalising and externalising problem behaviours in toddlers and preschoolers from the age of two years (Gilliom & Shaw, 2004). However there has been little research investigating the effects of parenting strategies relevant to infancy that may be risk factors for the development of problem behaviours. Potentially relevant parenting strategies include avoidant settling strategies such as controlled crying and use of dummies, physical discipline and a lack of parental positive engagement, touch, eye contact and warmth.

Implications of the findings of the current study for interventions designed to ameliorate the effects of maternal and child temperamental risk will be discussed next.

9.10.2 Implications for mental health promotion, prevention and intervention programs

There has been significant research involved in identifying aspects of maternal and child temperamental vulnerability associated with problem behaviours. This is an important first step. Research should also aim to increase understanding of mechanisms of influence including gene-environment interactions. The current study conceptualised toddler internalising and externalising problem behaviours as restrictions in emotion regulation associated with attachment anxiety and avoidance in the context of parenting stress. Research on developmental mechanisms informs the design of promotion, prevention and early intervention programs. Parenting programs have been shown to be effective in both improving maternal mental health and wellbeing and reducing problem behaviours in high risk populations of infants and toddlers (Powell & Dunlap, 2010). Evidence-based research is required to assess the efficacy of targeted programs in the amelioration of toddler internalising versus externalising problem behaviours.

Findings in the current study have demonstrated maternal and infant risk factors present in early infancy, and remaining relatively stable throughout infancy, have substantial effects on the development of toddler problem behaviours. *At risk* dyads, around 10% of the community sample, were found to have mothers with elevated depression and parenting stress and infants with difficult temperament. *At risk* dyads are purportedly more susceptible to environment effects (Pluess & Belsky, 2010). The current study demonstrated *at risk* dyads were more susceptible to the detrimental effects of parenting stress. However *at risk* dyads also have the most to gain, due to their differential susceptibility to environment effects, from promotion, prevention and intervention programs aimed at fostering social and emotional health and wellbeing of both mother and infant.

Conditions of risk were shown to exist from four months of age. Thus the current study's findings suggest targeted interventions should focus on buffering the effects of temperamental vulnerability in both mother and infant as early as possible in the infant's life. These may include supports and training programs that reduce

parenting stress and maternal depression. Interventions should also aim to increase positive, adaptive parenting that fosters the mental health and wellbeing of infants. Interventions may even begin antenatally to address maternal emotional vulnerability and minimise rearing environment risk. As there is likely to be a substantial genetic component to social emotional risk, Campbell, Shaw and Gilliom (2000) have highlighted the importance of adoption studies for their potential to clarify gene-environment interactions and inform the design of interventions to modify genetic liability.

For example, social emotional difficulty in this study's four month old infants included difficulty establishing feeding and sleeping routines and a lack of pleasure in social engagement. Infants with early elevated social emotional difficulty may be highly sensitive children whose neurophysiology renders them vulnerable to environmental risk. Further research into the neurophysiology of vulnerability and resilience would inform targeted interventions (Charney, 2004; Cicchetti, 2010). Not surprisingly, concordance between parenting stress and social emotional difficulties has demonstrated parents of these children were likely to be experiencing significant stress. The current study showed parenting stress and infant social emotional difficulty risk profiles were established by four months of age.

Prior research has suggested early sleep difficulties may be associated with the development of problem behaviours (Gregory & O'Connor, 2002; Lam, Hiscock & Wake, 2003). However little is known of the effects of sleep deprivation on the developing brain (Polimeni, Richdale & Francis, 2007). In the current study sleep difficulties represented an aspect of early difficult temperament and social emotional difficulty. Infant sleep interventions have been shown to be effective in improving maternal mental health and wellbeing and improving infant sleep (Lam et al.). There is little research however specifically investigating the effect of sleep interventions on infant problem behaviours.

The current study also identified an early lack of pleasure in social engagement as an infant risk factor associated with social emotional difficulty. Early deficits in

social information processing may indicate potential neurobiological compromise. Significant long term effects can be expected from underdevelopment of the infant's "social brain". Socialisation interventions such as those used with children with autism may ameliorate early social difficulties and potentiate positive developmental pathways (Reichow & Volkmar, 2010). For example the Greenspan "Floortime" approach to child development focuses on improving relating, interacting and communicating through playful interactions with a significant other (Greenspan, Wieder & Simons, 1998). "Floortime" has been used specifically with infants and children with special needs however it has relevance for fostering positive engagement and social interaction for all infants.

Targeted interventions are needed to provide support and education for these *at risk* mother-infant dyads to prevent ongoing mental health difficulties in both mother and child. Findings in the current study suggested early risk, in the first few months of life, may have more effect on subsequent internalising and other problem behaviours than externalising problem behaviours. It may also reflect predominantly genetic vulnerability. The effects of a compromised environment on children's problem behaviours may be expected to unfold over time and may not be as strongly represented in the early trajectories constructed in this study over the first two years of life. Alternatively, the findings in this study may demonstrate the effects of environmental risk begin at least as soon as mother and baby begin their postnatal relationship. Either way, the early establishment of trajectories of risk demonstrated in the current study highlighted the importance of beginning parent-child interaction interventions as early as possible. Mother-infant dyads may also benefit from a greater emphasis on child development knowledge in antenatal classes. Topics could include the parents' role in affect sharing and early emotion co-regulation and the detrimental effects of a negative rearing environment.

Other studies have also demonstrated early risk profiles for externalising problem behaviours are established from 12 months. The current study demonstrated social emotional difficulty and parenting stress profiles existed from just four months of age that predicted both externalising and internalising problem

behaviours in two year olds. Shaw, Owens, Giovannelli and Winslow (2001) have suggested the existence of early risk profiles highlighted the need for early interventions during infancy similar to those used with older children. Successful interventions have addressed aspects of the structure of the home environment, such as bedtime routines and play areas, developmentally appropriate parenting strategies, such as settling techniques and discipline and limit setting, and factors that compromise the quality of caregiving, such as maternal mental health and wellbeing and support (Webster-Stratton & Herbert, 1994).

There is increasing evidence supporting the effectiveness of early intervention in buffering biological and environmental vulnerability and reducing problem behaviours in high risk populations of infants and toddlers (Barlow, Smailagic, Ferriter, Bennett & Jones, 2010; Lundahl, Risser, & Lovejoy, 2006). There is less evidence supporting child behavioural outcomes in low risk populations (Hiscock, Bayer, Price, Ukoumunne & Wake, 2008). Mildon and Polimeni (2012) concluded early parenting programs showed improvements in more positive parent-child interactions, the home environment, and reduced maternal depression. No conclusions were drawn however regarding the reduction in internalising and externalising problem behaviours. Parenting programs such as the Triple P- Positive Parenting Program, the Incredible Years, PALS and Parent child interaction therapy (PCIT) have been shown to be successful in reducing toddler disruptive problem behaviours and improving maternal wellbeing with small to moderate effects, predominantly in high risk populations (Bagner et al., 2009; Barlow, Smailagic, Ferriter, Bennett, & Jones, 2010; Powell & Dunlap, 2010). However, whilst there may be evidence of demonstrated effectiveness there is less understanding of the mechanisms of why they work. Increased understanding of remedial mechanisms would optimise program design and effectiveness.

Person-centred findings in the current study point to targeted interventions. However some argue a universal approach to prevent stigmatising and missing children in need (Bayer, Hiscock, Morton-Allen, Ukoumunne & Wake, 2007). A universal primary prevention group-based Australian parenting program “Toddlers

without tears", aimed at reducing toddler externalising problem behaviours, included child development knowledge and positive parenting, limit setting and effective instructions techniques for parents when their infants were 8, 12 and 15 months of age (Hiscock, Bayer & Wake, 2005). The intervention included warm, sensitive parent-child interactions emphasised in attachment theory and social learning theory's principles of reinforcement and extinction. Although the program demonstrated maternal wellbeing outcomes, the intervention had no effect in reducing toddler externalising problem behaviours. This may have been due to the low risk nature of the universal sample. Thus it would appear targeted interventions for *at risk* mother-infant dyads may be more effective in demonstrating reductions in toddler problem behaviours.

Findings in the current study have highlighted the detrimental effects of parenting stress, maternal depression and infant sleep difficulties on the development of toddler problem behaviours. Infant research has tended to focus on the detrimental effects of risk factors on toddler socioemotional development. There has been a paucity of research however focusing on the differential susceptibility of *at risk* dyads to protective factors and interventions aimed at buffering temperamental risk. The current study found little support for the buffering role of positive marital relations in reducing both parenting stress and toddler problem behaviours. Resilience research in infant populations involving potentially *at risk* dyads who appear to be functioning well, would also inform intervention designs (O'Dougherty, Wright, Masten & Narayan, 2013). Research should focus on adaptable aspects of the mother-infant dyad and the rearing environment with the aim of reducing socioemotional maladjustment. Future intervention research should also investigate the effectiveness of introduced protective factors from parenting programs and targeted interventions.

For example, there have been documented benefits of massage for both mothers and babies. Compared with a control group, infants who were massaged fifteen minutes before being put to bed took less time to fall asleep and displayed more positive affect when awake (Field & Hernandez-Reif, 2001). Massaged infants

had lower levels of stress hormones than non-massaged infants (Field et al., 1996). Similarly, massage has been shown to alleviate stress, anxiety and depression in adults (Field, 2000). Thus interventions that utilise tactile stress reducing techniques such as massage may have benefits for both mother and infant.

Key findings arising from the analyses conducted in the three empirical chapters will be summarised in the following section.

9.11 Key findings

There were several key findings arising from the analyses conducted in the three empirical chapters that addressed gaps in the literature highlighted in the introductory section of this thesis. These related to the use of dimensions of maternal and infant attachment anxiety and avoidance; the comparison of individual versus relational and generic versus specific risk factors in the development of parent-child versus parent-other stress in infancy and toddler internalising versus externalising problem behaviours; mediation and moderation of the effects of early risk on toddler problem behaviours by concurrent parenting stress; early identification of *at risk* mother-infant dyads; and the covariation of internalising and externalising problem behaviours in toddlers.

Use of continuous dimensions of attachment anxiety and avoidance enabled the investigation of paths to parenting stress at 12 months and toddler problem behaviours at 24 months from maternal attachment anxiety and avoidance at 4 months and infant attachment anxiety and avoidance at 12 months. Differential effects of maternal versus infant attachment anxiety versus avoidance were interpreted as reflecting different developmental mechanisms. In particular, analyses supported functional differences in the maternal attachment strategies of derogation, lack of memory, idealisation and involving anger. Findings implicated interventions targeting specific attachment strategies. Contrary to expectation, infant attachment did not mediate maternal attachment effects on either parenting stress or toddler problem behaviours. This suggested there were independent

effects of maternal versus infant attachment. IHowever limited power may have masked any mediation.

Maternal and child characteristics were shown to more influential than relational constructs in the development of parenting stress and toddler problem behaviours. Whereas effects of individual characteristics were moderate, attachment effects were small. Maternal attachment anxiety and infant attachment avoidance predicted both parenting stress and toddler internalising problem behaviours. Nonetheless the demonstration of small attachment effects over and above rearing environment risk was an important finding that addressed a significant gap in the literature. Negative marital relations were shown to have an indirect effect via maternal depression. No effects of positive marital relations were observed. The latter addresses another gap identified in the introduction, namely the lack of empirical investigation of the potentially protective effects of a supportive spouse on the development of toddler problem behaviours.

Maternal depression and stress and infant difficult temperament were shown to be generic risk factors for both internalising and externalising problem behaviours. This was in contrast to the specific relations of the attachment dimensions described above. Consistent with expectation however, infant difficult temperament was more strongly associated with parent-child than parent-other stress and internalising than externalising toddler problem behaviours. Concurrent parenting stress moderated the effects of early risk factors on toddler problem behaviours as expected. However there were different moderation relations for internalising versus externalising problem behaviours. Stress moderated the effect of early difficult temperament on internalising problem behaviours. Externalising behaviours were predicted by interactions between stress and early maternal depression, social emotional difficulty and positive marital relations.

Person-centred analyses in chapter eight demonstrated trajectories of risk were established by four months of age. Around 15% of the mother-infant dyads were *at risk* with borderline clinical levels of parenting stress and social emotional

difficulty. This was a key finding which highlighted the need for targeted early intervention. The remaining dyads formed a low risk trajectory. Thus findings supported just two trajectories in the study's low risk community sample. This was less than the more commonly reported three trajectories in higher risk and older child populations. Risk predicted higher internalising and total toddler problem behaviours. The difference between trajectories on externalising problem behaviours indicated the same trend but was not significant.

The consideration of both internalising and externalising problem behaviours in the same study and demonstration of generic versus specific risk factors made a significant contribution to the body of toddler problem behaviour knowledge. Covariation between internalising and externalising problem behaviours was found to be higher in infancy than at later developmental stages. Classes of toddler problem behaviours did not distinguish pure from covarying problem behaviours. This was interpreted as reflecting a relative lack of differentiation across infancy. Findings were interpreted with caution due to the relatively small sample at the 24 month stage of the study and required replication in a larger sample.

9.12 Concluding comments

Longitudinal investigations undertaken in the current study investigated purported interrelations amongst maternal and infant attachment, difficult temperament, marital relations, parenting stress, and toddler internalising and externalising problem behaviours using a reconceptualisation of Belsky's (1984) "Determinants of parenting" model. Parenting stress was proposed to mediate effects of maternal, child and relationship risk factors on the development of toddler problem behaviours. Differential associations amongst risk factors and toddler problem behaviours with different sources of parenting stress were investigated. Common underlying difficulties in emotion regulation were proposed to link maternal and infant attachment anxiety and avoidance to toddler internalising and externalising problem behaviours. Growth trajectories identified *at risk* mother-

infant dyads as those with either elevated early infant social emotional difficulty and/or mothers' with elevated parenting stress. Early identification of *at risk* mother-infant dyads and their associated risk profile has implications for the timing and design of early interventions to foster mental health and wellbeing for mothers and their infants.

Both maternal and infant attachment were represented in the current study by two continuous dimensions of attachment anxiety and avoidance. Concordant and inverted pathways from maternal to infant attachment anxiety and avoidance were supported. Paths from maternal attachment anxiety were due to involving anger with either parent or passivity of discourse in the Adult Attachment Interview. Different aspects of maternal attachment avoidance were associated with infant attachment anxiety versus avoidance. Lack of memory predicted infant attachment anxiety whereas derogation of mother predicted infant attachment avoidance. Idealisation of mother was a generic predictor of both infant attachment anxiety and avoidance. Thus this study demonstrated differential effects on the mother-infant attachment relationship resulting from the mothers' predominant use of a particular avoidant strategy.

The current study hypothesised different pathways to parenting stress arising from a mother's relationship with her child compared with stress arising from her relationships with her spouse and others. Findings supported a greater effect of child difficult temperament on parent-child than parent-other stress. Similarly, findings supported a greater effect of negative marital relations and maternal attachment anxiety on parent-other than parent-child stress. Whilst it was possible construct overlap may account for these findings, they were consistent with theoretical predictions. Infant attachment avoidance was negatively associated with parenting stress in both domains. Neither infant attachment anxiety nor positive marital relations affected parenting stress. Infant difficult temperament may have accounted for any relation between infant attachment anxiety and parenting stress. Buffering effects of positive marital relations do not appear to be evident in a low risk population. Maternal depression had the greatest effect on predicting both parent-

other and parent-child stress and mediated the effect of negative marital relations in either domain. Thus maternal and child characteristics had greater effects on parenting stress than relationship factors such as marital relations and infant attachment. Differences in paths to parent-other versus parent-child stress may be partially due to construct overlap and shared method variance. Inclusion of observational measures would provide clarification.

According to the reconceptualisation of Belsky's "Determinants of parenting" model (1984), early maternal, child and relationship risk factors were hypothesised to contribute to parenting stress which in turn was associated with concurrent toddler problem behaviours. Whereas parenting stress was viewed as a generic predictor of problem behaviours, attachment anxiety and avoidance and aspects of temperament were expected to differentiate internalising versus externalising toddler problem behaviours. Early positive and negative marital relations were not associated with toddler problem behaviours. Findings supported partial mediation by parenting stress of the effects of early maternal depression, infant difficult temperament and social emotional difficulty on the development of toddler problem behaviours.

Small direct effects of maternal attachment anxiety and infant attachment avoidance on toddler problem behaviours existed over and above the effects of parenting stress. Infant attachment avoidance was associated with internalising toddler problem behaviours. This finding was consistent with social withdrawal underlying both attachment avoidance and internalising behaviours. AAI involving anger protected against the development of toddler internalising problem behaviours. This finding was interpreted as moderate emotion expression providing socialisation of emotion in the context of otherwise low risk. Derogation of mother was a risk factor for toddler externalising problem behaviours. It was concluded active expressed contempt for attachment may reflect a mother's inability or unwillingness to infer the mental state of her toddler resulting in mother-infant conflict. Global aspects of difficult temperament including unapproachability/ unadaptability, uncooperativeness/ unmanageability and irritability however did not

differentiate between dimensions of toddler problem behaviours. Consistent with transactional models of development interactions amongst risk factors were also associated with toddler problem behaviours.

There was significant covariation between toddler internalising and externalising problem behaviours as in prior studies with older children. This was interpreted as reflecting common underlying pathology, possibly represented by elevated emotional reactivity, that may be expected to differentiate into predominant internalising versus externalising problem behaviours over time. Further longitudinal research is required to track the course of pure versus covarying internalising and externalising problem behaviours with development to determine differentiation of problem behaviours into predominant syndromes.

Latent growth analyses conducted in the current study indicated *at risk* mother-infant dyads could be identified by either early social emotional difficulty or elevated parenting stress and comprised between 10-20% of the low risk community sample. Risk factors included persistent difficult temperament and elevated maternal depression throughout infancy and were associated with subclinical elevated internalising and externalising problem behaviours when the infants were two years old.

The effects of genetic vulnerability may be ameliorated by early intervention using evidence-based parenting programs to reduce contextual risk and potentiate adaptive developmental pathways. Findings from the current study point to interventions that aim to reduce maternal stress and depression and increase infant rhythmicity and dyadic pleasure in social engagement. Parenting programs have been shown to be effective in reducing problem behaviours in targeted high risk populations but not universal community populations. In the current study, universal screening using the Ages and Stages Social Emotional questionnaires provided a quick and effective means of identifying *at-risk* mother-infant dyads for targeted parenting interventions.

Although it is widely accepted adaptation is the joint product of developmental history and current circumstance, many research designs have neglected to incorporate longitudinal designs with both contemporaneous and prior variables in their prediction of infant adjustment (Bowlby, 1969; McMahon, Grant, Thurm & Ey, 2003; Lamb, 1987; Sroufe, Carlson, Levy & Egeland, 1999). Conclusions from much of the attachment research have been limited by reduced statistical power due to small sample sizes, inadequate longitudinal designs that have failed to incorporate contemporaneous associations and the use of categorical measures and assumed data structure. The current study incorporated concurrent parenting stress with earlier risk factors, including dimensions of maternal and infant attachment anxiety and avoidance, to predict toddler internalising and externalising problem behaviours.

Parenting stress and attachment were found to have relatively independent direct effects on the development of toddler problem behaviours. Whereas parenting stress represented the generic detrimental effect of contextual risk, both maternal attachment anxiety and infant attachment avoidance provided specific paths to internalising or externalising problem behaviours consistent with hypothesised restrictions in attention and emotion regulation. Whether toddlers develop predominantly internalising or externalising problem behaviours is likely to be determined by factors such as physiological aspects of child temperament and parenting strategies affecting the parent-child relationship.

Analyses in the current study were constrained by limitations arising from time and budget constraints. Limitations included a moderate sample size, particularly when the infants were two years old, and a reliance on maternal report measures. Inclusion of observed parenting, marital relations and infant temperament and behaviour measures would have added significantly to the study. Strengths of the study however include the longitudinal design, use of attachment dimensions of anxiety and avoidance and the integration of attachment, parenting and temperament constructs. Directions for future research include evaluations of interventions including stress reduction, infant settling and positive interaction techniques in targeted *at risk* mother-infant dyads identified by universal infant

social emotional difficulty, maternal depression and maternal stress screening. Further investigation of specific aspects of parenting and infant temperament in conjunction with maternal and infant attachment may shed light on developmental mechanisms involved in the development of toddler internalising and externalising problem behaviours.

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Appendices

Appendix 1

Plain Language Statement

BALLARAT MOTHER-INFANT RELATIONSHIP STUDY

UNIVERSITY OF BALLARAT

BALLARAT CHILD AND FAMILY SERVICES

Researchers
Ms Patricia Reed, Associate Professor Rapson Gomez

About the Study
We are conducting research on the development of mother-child relationships. Findings from this Study are expected to improve our understanding of mother-child relationships and therefore benefit families.

We are looking for mothers and their babies to participate in our Study. It is expected to require a total of approximately four and a half hours of your time spread over 2 years: 2.5 hours when your child is less than four months of age; 1.5 hours hour at twelve months and 1 hour at two years. The Study will be conducted in an interview room at the Ballarat Child and Family Services offices, Ludbrook House, Lydiard Street, Ballarat at a mutually convenient time during business hours, Monday to Friday.

The study will be conducted in 3 phases:

1 <u>When your baby is less than 4months of age.</u>
You will be asked to answer a series of questions relating to your childhood. The interview will be audio taped and is expected to take just over an hour. It is not unusual for people to get upset when answering questions about the past. Should this happen please remember you are free to withdraw from the Study at any time and that you will also have access to a counseling service. Following the taped interview, you will be asked to complete 2 relationship questionnaires and a current stress questionnaire. It is estimated that the questionnaires will take approximately one hour to complete. Your total time commitment at this phase will be about 2 and half hours. You will need to make alternative arrangements for the care of your baby during this time to allow you to give the tasks your full attention. Childcare arrangements may be provided should you require them. You may also choose to complete the questionnaires at home and return to me by post if this is more convenient. We will reimburse you $20 to cover any travel and childcare expenses incurred as a result of your participation at this stage of the Study.

2 <u>When your child is 1 year old</u>
You will be sent the relationship and stress questionnaires for completion at home and asked to bring them with you when you and your infant attend your 12 month visit. At this visit, you and your infant will be videotaped in a twenty-minute sequence of brief (maximum of 3 minutes each) mother-infant separation and reunion episodes to study your relationship. When separated, you will be able to see your infant through a 2 way mirror. The session will be terminated immediately at your request or at our discretion should you or your infant become overly distressed. Following the videotape, you will be asked to sort a set of behavior descriptions in nine piles ranging from those "most like" to those "least like" your child. The sorting will take place in a child-friendly room so that your infant will be free to play while you complete this task. It is expected that you will need to set aside about an hour to complete both tasks. We will also reimburse you $20 to cover any travel expenses incurred as a result of your participation at this stage of the Study.

3 When your child is 2 years old
You will be sent 4 questionnaires for completion and return in a pre-paid addressed envelope. Three of the questionnaires are the relationship and stress questionnaires that you have done twice before. The fourth questionnaire measures your child's behavior at age 2. These should take about one hour of your time in total.

Should you choose to participate in the Study you will be assigned a code number to ensure the anonymity of your responses. Combined and not individual results will be reported in the Study's findings which will be available at the University of Ballarat library at the conclusion of the Study. You are free to withdraw from this or any future related studies at any time. Should you choose to withdraw any information collected from you will be destroyed and not used. To ensure participant confidentiality, all data collected as part of this Study will be kept in a secure location for a period of 5 years following the publication of Study findings, after which time it will be destroyed.

We would also like to offer you the opportunity to be provided a full psychological assessment for your child at age 2 years upon completion of participation in this Study. The assessment would be conducted at the University of Ballarat, is free of charge and would provide you with information regarding your child's motor, language and intellectual development.

Thank you for considering our Study. If you would like to participate, kindly complete the attached Consent form and return it to me in the pre-paid envelope provided. Please do not hesitate to contact either myself or Rapson should you have any further questions.

Kind Regards and Thank You for your consideration

Patricia Reed
Research Student
Doctor of Philosophy Program
University of Ballarat

Any questions regarding this project can be directed to the Student Investigator, Patricia Reed on (03)5424 1035 or the Principal Researcher, Associate Professor Rapson Gomez **of the School of Behavioral and Social Sciences and the Humanities on telephone number (03)5327 9760**

Should you (i.e. the participant) have any concerns about the conduct of this research project, please contact the Executive Officer, Human Research Ethics Committee, Research & Graduates Studies Office, University of Ballarat, PO Box 663, Mt Helen VIC 3353. Telephone: (03) 5327 9765.

Appendix 2

Informed Consent Form

MOTHER-INFANT ATTACHMENT STUDY

UNIVERSITY OF BALLARAT
BALLARAT CHILD and FAMILY SERVICES

INFORMED CONSENT

Participant Code Number . . . .

Consent (fill out below)

I,. . . . . ……..

of (Address & Phone No). . . . . ….. . . . . ..

. . . . . .

Appendix 3

Background Information Questionnaire

MOTHER-INFANT RELATIONSHIP STUDY

UNIVERSITY OF BALLARAT and BALLARAT CHILD and FAMILY SERVICES

BACKGROUND INFORMATION

1 Participant Code Number . . . . . **Date** . . ..

2 Date of Birth
Adult Participant . . . . . Infant . . ..

3 Gender
Adult Participant . . . . . Infant . . ..

4 Number and Gender of older siblings (if any)

5 Persons living in the family home

Person	Relationship to Adult Participant

6 Marital History (please circle)

Married	Years married	……
Separated	Years since separation (if applicable)	. . .. . .
Divorced	Years since divorce (if applicable)	. . .. . .
Single		
Other	……..	

7 Mother's Current Employment (please circle)

Full-time paid employment outside the home
Full-time paid employment at home
Part-time paid employment outside the home
Part-time paid employment at home
At home full-time on Maternity Leave or not in paid employment
Other (please specify number of hours/week) ……

8 Care of Child Participant by Persons other than the Mother

Please indicate who else takes care of the child participant, their relationship to the child, the number of hours per week involved and in what location

9 Occupation

Mother's occupation……

Father's occupation…….

10 Family Income (please provide an estimate of current annual family income)

Less than $20,000	
Between $20,000 and $29,999	
Between $30,000 and $39,999	
Between $40,000 and $49,999	
Between $50,000 and $59,999	
Between $60,000 and $69,999	
Between $70,000 and $79,999	
Between $80,000 and $89,999	
Between $90,000 and $99,999	
Between $100,000 and $149,999	
Greater than $150,000	

11 Education (please indicate the highest level of education completed)

	Mother	**Father**
Some Primary School		
Primary School completed		
Some Secondary		
Secondary completed to Year 12		
Associate or Undergraduate Diploma		
Bachelor Degree commenced		
Bachelor Degree completed		
Postgraduate Diploma		
Tertiary Higher Degree commenced		
Tertiary Higher Degree completed		

11 Substance Use (please indicate frequency of use of the following)

	Nicotine	**Marihuana**	**Alcohol**
Never			
Occasionally			
More than once a week (amount)			
Daily (please indicate amount)			

12 Are you currently taking any medication or have you previously taken any medication for a mental illness?
(If yes please specify the nature of the illness, the type of medication and daily dosage)

13 Please provide any additional information that you may feel is relevant to this study

Appendix 4
Reliability coding scale percentage agreements for the Adult Attachment Interviews and Strange Situations

Rating scale	Percent agreement ***
AAI State of mind scale*	
Dismissing	
Idealisation-Mother	93.5
Idealisation-Father	93.5
Derogation-Mother	100.0
Derogation-Father	93.5
Lack of Memory	90.3
Preoccupied	
Involving Anger-Mother	100.0
Involving Anger-Father	90.3
Passivity	93.5
Strange Situation interactive behaviour scale**	
First reunion	
Proximity seeking	100.0
Contact Maintenance	93.3
Avoidance	93.3
Resistance	100.0
Second reunion	
Proximity seeking	93.3
Contact Maintenance	76.7
Avoidance	83.3
Resistance	96.7

* AAI= Adult Attachment Interview. Reliability coding agreement as within 1.5 scale points

** SS= Strange Situation. Reliability coding agreement as within one scale point

*** Reliability coding on 30 randomly selected AAIs and SSPs

Appendix 5
Background characteristics across infancy

Measures	Infant age (months) 4 (N=142) Freq	%	12 (N=125) Freq	%	24 (N=47) Freq	%	Test statistics χ^2	df	p
Father's Education Level:							0.26	4	ns
Post secondary	61	*(45.8)*	56	*(46.3)*	20	*(44.4)*			
Secondary school completed	38	*(28.6)*	33	*(27.3)*	14	*(31.1)*			
Primary school completed	34	*(25.6)*	32	*(26.4)*	11	*(24.4)*			
Father's Occupation:							2.36	10	ns
Management	15	*(11.5)*	12	*(10.2)*	7	*(15.6)*			
Professional	36	*(27.5)*	33	*(28.0)*	10	*(22.2)*			
Associate Professional	13	*(9.9)*	13	*(11.0)*	3	*(6.7)*			
Tradesperson	32	*(24.4)*	29	*(24.6)*	12	*(26.7)*			
Clerical,service and labourer	18	*(2.3)*	16	*(2.5)*	6	*(2.2)*			
Intermediate production and transport	17	*(13.0)*	14	*(11.9)*	7	*(15.6)*			
Mother's Education Level:							4.55	4	ns
Post secondary	99	*(72.5)*	92	*(73.6)*	41	*(85.4)*			
Secondary school completed	21	*(15.2)*	19	*(15.2)*	3	*(6.3)*			
Primary school completed	17	*(12.3)*	14	*(11.2)*	4	*(8.3)*			
Mother's Occupation:							1.65	6	ns
Management	10	*(7.3)*	8	*(6.5)*	4	*(8.3)*			
Professional	57	*(41.6)*	56	*(45.2)*	26	*(22.2)*			
Associate Professional	13	*(9.5)*	11	*(8.9)*	4	*(6.7)*			
Clerical, service, trade, production and transport	47	*(8.8)*	49	*(9.7)*	14	*(2.2)*			
Family Income Level:							33.41	4	<.001
less than $50,000	42	*(30.7)*	21	*(17.9)*	9	*(18.8)*			
between $50,000 and $79,999	61	*(44.5)*	55	*(47.0)*	13	*(27.1)*			
greater than $80,000	34	*(24.8)*	41	*(35.1)*	26	*(54.2)*			
Mother and child separation:							375.90	4	<.001
Less than 20 hours per week	130	*(94.9)*	77	*(66.4)*	25	*(52.1)*			
More than 20 hours per week	7	*(5.1)*	39	*(33.6)*	23	*(47.9)*			
Mother employment:							255.03	6	<.001
Full time (>30 hours per week)	4	*(2.9)*	8	*(6.9)*	5	*(10.4)*			
Part time (20 to 30 hours per week)	17	*(12.2)*	59	*(50.4)*	25	*(52.1)*			
Casual (<20 hours per week)	6	*(4.3)*	2	*(1.7)*	1	*(2.1)*			
Home full time	112	*(80.6)*	48	*(41.0)*	17	*(35.4)*			
Maternal age:									
<30.0 years	43	*(31.9)*	41	*(34.2)*	17	*(37.0)*	2.36	4.0	ns
30.0-34.9 years	52	*(38.5)*	44	*(36.7)*	13	*(28.3)*			
>35.0 years	40	*(29.6)*	35	*(29.2)*	16	*(34.8)*			
	135		120		46				
Child gender:							2.51	2	ns
Girls	70	*(50.4)*	60	*(48.0)*	19	*(39.6)*			
Boys	69	*(49.6)*	65	*(52.0)*	29	*(30.4)*			
Number of older siblings:							2.53	4	ns
Two or more	19	*(13.7)*	17	*(13.6)*	7	*(14.6)*			
One	46	*(33.1)*	39	*(31.2)*	11	*(22.9)*			
None	74	*(53.2)*	69	*(55.2)*	30	*(62.5)*			
Parent relationship:							2.80	4	ns
Less than 5 years	65	*(52.8)*	62	*(55.9)*	26	*(63.4)*			
Between 5 and 10 years	42	*(34.1)*	37	*(33.3)*	12	*(29.3)*			
Greater than 10 years	16	*(13.1)*	12	*(10.8)*	3	*(7.3)*			
Dizygotic twins	2	*(1.4)*	2	*(1.7)*	0	*(0.0)*	-		
Solo parenting	4	*(2.7)*	5	*(4.1)*	1	*(2.1)*	-		

Appendix 5
Background characteristics across recruitment group

Measures	Recruitment group: MCH (N=63) Freq	%	Day Stay (N=25) Freq	%	Hospital (N=32) Freq	%	Test statistics χ^2	df	p
Father's Education Level:							1.09	4	ns
Post secondary	29	*(43.5)*	10	*(41.7)*	16	*(53.3)*			
Secondary school completed	19	*(30.6)*	7	*(29.2)*	7	*(23.3)*			
Primary school completed	16	*(25.8)*	7	*(29.2)*	7	*(23.3)*			
Father's Occupation:							8.52	10	ns
Management	8	*(13.8)*	3	*(13.6)*	1	*(3.2)*			
Professional	14	*(24.1)*	6	*(27.3)*	10	*(32.3)*			
Associate Professional	8	*(13.8)*	2	*(9.1)*	3	*(9.7)*			
Tradesperson	13	*(22.4)*	7	*(31.8)*	8	*(25.8)*			
Clerical,service and labourer	7	*(12.1)*	4	*(18.2)*	3	*(9.7)*			
Intermediate production and transport	8	*(13.8)*	-	-	6	*(19.4)*			
Mother's Education Level:							3.78	4	ns
Post secondary	47	*(74.6)*	18	*(72.0)*	23	*(71.9)*			
Secondary school completed	11	*(17.5)*	5	*(20.0)*	3	*(9.4)*			
Primary school completed	5	*(7.9)*	2	*(8.0)*	6	*(18.8)*			
Mother's Occupation:							3.88	6	ns
Management	4	*(6.6)*	3	*(12.5)*	1	*(3.1)*			
Professional	28	*(45.9)*	11	*(45.8)*	13	*(40.6)*			
Associate Professional	7	*(11.5)*	2	*(8.3)*	2	*(6.3)*			
Clerical, service, trade, production and transport	22	*(36.1)*	8	*(33.3)*	16	*(50.0)*			
Family Income Level:							6.34	4	ns
less than $50,000	19	*(31.1)*	7	*(28.0)*	7	*(21.9)*			
between $50,000 and $79,999	30	*(49.2)*	12	*(48.0)*	11	*(34.4)*			
greater than $80,000	12	*(19.7)*	6	*(24.0)*	14	*(43.8)*			
Mother and child separation:							3.04	2	ns
Less than 20 hours per week	59	*(98.3)*	24	*(96.0)*	29	*(90.6)*			
More than 20 hours per week	1	*(1.7)*	1	*(4.0)*	3	*(9.4)*			
Mother employment:							4.42	4	ns
Full time (>30 hours per week)	1	*(1.6)*	-	-	1	*(3.1)*			
Part time (20 to 30 hours per week)	-	-	-	-	-	-			
Casual (<20 hours per week)	9	*(14.8)*	7	*(28.0)*	3	*(9.4)*			
Home full time	51	*(83.6)*	18	*(72.0)*	28	*(87.5)*			
Maternal age:							7.69	4	ns
<30.0 years	20	*(32.3)*	14	*(56.0)*	8	*(26.7)*			
30.0-34.9 years	26	*(41.9)*	4	*(16.0)*	12	*(40.0)*			
>35.0 years	16	*(25.8)*	7	*(28.0)*	10	*(33.3)*			
Child gender:							3.47	2	ns
Girls	31	*(49.2)*	8	*(32.0)*	18	*(56.2)*			
Boys	32	*(50.8)*	17	*(68.0)*	14	*(43.8)*			
First time mother							7.90	2	<.05
Yes	29	*(46.0)*	20	*(80.0)*	18	*(56.2)*			
No	34	*(54.0)*	5	*(20.0)*	14	*(43.8)*			
Parent relationship:							9.39	4	<.05
Less than 5 years	40	*(67.8)*	19	*(82.6)*	13	*(54.2)*			
Between 5 and 10 years	11	*(18.6)*	2	*(8.7)*	10	*(42.7)*			
Greater than 10 years	8	*(13.6)*	2	*(8.7)*	1	*(4.2)*			
Dizygotic twins	1	*(1.6)*	1	*(4.0)*	-	-	-		
Solo parenting	4	*(6.3)*	0	*(0.0)*	-	-	-		

Appendix 5
Background characteristics across primo versus multiparous mothers

Measures	Recruitment group: First time mothers (N=68) Freq	First time mothers (N=68) %	Two or more children (N=52) Freq	Two or more children (N=52) %	Test statistics χ^2	df	p
Father's Education Level:					2.10	2	ns
Post secondary	32	*(49.2)*	21	*(41.2)*			
Secondary school completed	15	*(23.1)*	18	*(35.3)*			
Primary school completed	18	*(27.7)*	12	*(23.5)*			
Father's Occupation:					11.49	5	<.05
Management	6	*(9.5)*	6	*(12.5)*			
Professional	21	*(33.3)*	9	*(18.8)*			
Associate Professional	6	*(9.5)*	7	*(14.6)*			
Tradesperson	17	*(27.0)*	11	*(22.9)*			
Clerical,service and labourer	10	*(15.9)*	4	*(8.3)*			
Intermediate production and transport	3	*(4.8)*	11	*(22.9)*			
Mother's Education Level:					3.62	2	ns
Post secondary	53	*(77.9)*	35	*(67.3)*			
Secondary school completed	7	*(10.3)*	12	*(23.1)*			
Primary school completed	8	*(11.8)*	5	*(9.6)*			
Mother's Occupation:					5.23	3	ns
Management	7	*(10.3)*	1	*(2.0)*			
Professional	32	*(47.1)*	20	*(40.8)*			
Associate Professional	7	*(10.3)*	4	*(8.2)*			
Clerical, service, trade, production and transport	22	*(32.4)*	24	*(49.0)*			
Family Income Level:					3.54	2	ns
less than $50,000	23	*(34.3)*	10	*(19.6)*			
between $50,000 and $79,999	26	*(38.8)*	27	*(52.9)*			
greater than $80,000	18	*(26.9)*	14	*(27.5)*			
Mother and child separation:					.02	1	ns
Less than 20 hours per week	64	*(95.5)*	48	*(96.0)*			
More than 20 hours per week	3	*(4.5)*	2	*(4.0)*			
Mother employment:					.05	2	ns
Full time (>30 hours per week)	1	*(1.5)*	1	*(2.0)*			
Part time (20 to 30 hours per week)			-	-			
Casual (<20 hours per week)	11	*(16.2)*	8	*(16.0)*			
Home full time	56	*(82.4)*	41	*(82.0)*			
Maternal age:					10.16	2	<.01
<30.0 years	32	*(47.8)*	10	*(20.0)*			
30.0-34.9 years	18	*(26.9)*	24	*(48.0)*			
>35.0 years	17	*(25.4)*	16	*(32.0)*			
Child gender:					5.40	1	<.05
Girls	26	*(38.2)*	31	*(59.6)*			
Boys	42	*(61.8)*	21	*(40.4)*			
Parent relationship:					14.15	2	<.01
Less than 5 years	50	*(82.0)*	22	*(48.9)*			
Between 5 and 10 years	6	*(9.8)*	17	*(37.8)*			
Greater than 10 years	5	*(8.2)*	6	*(13.3)*			
Dizygotic twins	2	*(2.9)*	-	-			
Solo parenting	4	*(5.8)*	-	-			

Appendix 6

Associations amongst maternal attachment, difficult temperament and parenting stress at 4 months and infant attachment at 12 months

			AAI Dismissing State of Mind Scales					AAI Preoccupied State of Mind Scales			Parenting stress				Difficult temperament				SS Avoidance scales			SS Anxiety Scales	
Measures	**Mean**	***(SD)***	**IdM**	**IdF**	**DerM**	**DerF**	**LM**	**Pas**	**AngM**	**AngF**	**Tot**	**Par**	**Child**	**LE**	**Dif**	**UnCo**	**UnAp**	**Irr**	**R2PS**	**R2CM**	**R2A**	**R1R**	**R2R**
Maternal attachment avoidance																							
Idealisation (mother)	2.75	*(1.73)*	**.44****		-.08	.06	.14	**-.23***	**-.29****	**-.23***	**-.38****	**-.38****	**-.26****	-.07	-.17	-.15	-.06	-.20*	-.08	-.11	.18	.05	.07
Idealisation (father)	2.18	*(1.59)*			-.04	-.07	.12	**-.36****	**-.20***	**-.32****	-.10	-.14	.02	-.08	-.03	-.13	.06	-.02	-.04	-.07	.06	-.14	-.07
Derogation (mother)	1.09	*(0.37)*				.14	.05	-.05	.13	-.13	.17	.17	.12	**.28***	-.02	-.03	.01	-.02	-.18*	-.18	.17	-.03	-.02
Derogation (father)	1.09	*(0.44)*					-.06	.01	.01	.04	-.13	-.14	-.06	**.20***	-.07	'-.04	-.06	-.08	-.07	-.07	-.02	-.10	-.09
Lack of memory	2.75	*(1,71)*						**-.30****	**-.18***	**-.26****	-.09	-.06	-.12	-.09	-.17	-.12	-.08	**-.19***	-.10	-.12	.12	.02	-.03
Maternal attachment anxiety																							
Passivity	2.03	*(1.22)*							.13	**.23***	**.27***	**.22***	.14	.00	.08	.13	-.03	.09	-.09	-.06	.01	**.24****	.14
Anger (mother)	1.85	*(1.75)*								**.53****	.15	.14	.05	.10	-.06	.00	-.03	-.10	.08	-.10	.13	.11	.14
Anger (father)	1.85	*(1.58)*									**.17**	.18	.08	.18	.00	.03	-.02	0.00	.08	.00	.04	**.20***	.16
Parenting stress total	214.42	*(42.71)*										**.93****	**.84****	.13	**.58****	**.49****	**.38****	**.52****	.02	.08	.05	.04	-.03
Parent-other	120.63	*(28.51)*											**.58****	.17	**.48****	**.40****	**.32****	**.42****	-.01	.03	.08	.03	.02
Parent-child	93.77	*(19.57)*												.05	**.61****	**.48****	**.41****	**.54****	.10	.17	-.07	.04	-.09
Life events	11.61	*(7.54)*													-.05	-.09	.02	-.05	-.12	-.08	.13	.03	.07
Child difficult temperament	**2.49**	***(0.66)***														**.81****	**.73****	**.86****	.00	.10	-.12	.09	.11
Unco operation/unmanageability	2.46	*(0.66)*															**.43****	**.59****	.01	.03	-.09	.17	.13
unadaptability/unapproach	2.23	*(0.78)*																**.36****	.08	**.23***	-.07	.08	**.23***
Irritability	2.78	*(1.01)*																	-.06	-.01	-.11	-.01	-.06
Infant attachment avoidance																							
R2 Proximity seeking (neg)	4.07	*(1.83)*																		**.67****	**-.67****	.11	.15
R2 Contact maintenance (neg)	3.78	*(2.23)*																			**-.57****	**.26****	**.35****
R2 Avoidance	2.50	*(1.78)*																				-.07	.00
Infant attachment anxiety																							
R1 Resistance	1.59	*(1.18)*																					**.71****
R2 Resistance	2.12	*(1.58)*																					

p<.05, **p<.01

Appendix 7
Principal components analyses of the Adult Attachment Interview State of Mind and Strange Situation Interactive Reunion Behavior scales

	Two-factor solution		Four-factor solution			
AAI state of mind scale	**1**	**2**	**1**	**2**	**3**	**4**
Avoidant scales						
Idealisation father	**-0.66**	-0.18	**0.79**	-0.22	0.20	-0.05
Idealisation mother	**-0.61**	-0.26	**0.78**	-0.11	-0.04	0.01
Lack of memory	**-0.51**	0.25	0.02	-0.24	**0.73**	-0.06
Derogation father	0.04	**0.49**	0.14	-0.01	-0.31	**0.79**
Derogation mother	-0.04	**0.83**	-0.23	0.03	0.39	**0.70**
Anxiety scales						
Involving anger father	**0.72**	-0.12	-0.14	**0.79**	-0.30	-0.11
Involving anger mother	**0.63**	0.22	-0.18	**0.88**	0.03	0.11
Passivity of discourse	**0.60**	-0.19	**-0.50**	-0.05	**-0.65**	-0.04

Highest loadings in bold

Strange Situation Interactive Behaviour Rating Scale	**Factor**	
	Avoidance	**Anxiety**
Avoidance		
1st reunion	-0.77	-0.20
2nd reunion	**-0.88**	0.11
Contact Maintenance		
1st reunion	0.58	0.58
2nd reunion	**0.73**	0.23
Proximity Seeking		
1st reunion	0.69	0.38
2nd reunion	**0.81**	0.00
Resistance		
1st reunion	0.08	**0.92**
2nd reunion	0.06	**0.87**

Bold values indicate the scales used to form the Infant Attachment Avoidance and Anxiety scales

Appendix 8
Background characteristics and study constructs

Study constructs	Family background characteristics at 4 months								
	Mat Age	Inf Gen	Fam size	Rel Dur	Mat Emp	Sep	Income	Mat Ed	Fath Ed
4 months									
Maternal Attach Anxiety	.45	.01	3.27*	.68	1.42	.20	1.11	.26	.09
Mat Attach Avoidance	.61	.16	.47	.11	1.10	2.91^	.17	3.31*	1.19
Maternal depression	.54	1.35	.94	1.54	.96	.34	.06	.01	1.89
Difficult temperament	.21	.39	.68	3.81*	.62	.33	.08	1.43	2.30
Social emotional dif	1.18	1.35	.30	.56	.40	.11	1.13	.16	3.17*
Pos marital relations	4.21*	.13	.13	2.94^	.34	.03	.84	.09	.24
Neg marital relations	1.91	.07	2.41^	.15	.24	.02	.09	.52	.10
Parent-Other stress	1.57	.72	1.52	1.36	.54	.36	.91	.61	.04
Parent-Child stress	.07	.82	.05	2.58^	.63	.27	.04	1.47	.70
12 months									
Infant Attach Anxiety	1.70	.02	2.89^	2.53^	1.14	6.02*	.33	2.13	1.05
Infant Attach Avoidance	1.07	.60	5.74**	1.26	.75	.09	.69	1.05	2.04
Maternal depression	.15	1.48	1.11	.34	.84	2.32	2.03	.47	.60
Difficult temperament	2.04	.53	.90	1.20	.80	.74	.23	.76	.28
Social emotional dif	.21	.06	2.19	.39	.54	.52	1.05	.58	1.05
Pos marital relations	.84	.58	.26	.69	4.02**	.03	.09	.63	1.09
Neg marital relations	.36	2.02	.75	.23	1.95	.00	.01	.54	2.06
Parent-Other stress	1.44	.85	4.29*	.28	1.30	.63	1.67	.54	.61
Parent-Child stress	.34	.50	1.00	.61	1.64	3.55^	.81	.85	.09
24 months									
Maternal depression	.15	.00	1.03	.55	5.39**	3.55^	.46	.12	.71
Difficult temperament	1.73	1.59	.09	3.29*	.07	.07	.74	.07	.29
Social emotional dif	2.76^	1.03	.46	2.29	1.88	3.53^	1.29	.13	.29
Pos marital relations	1.80	.22	.25	.87	5.05**	6.21*	.30	.03	2.13
Neg marital relations	.45	.06	.26	.13	1.27	.14	.13	.41	3.11^
Parent-Other stress	.84	1.42	2.85^	1.01	1.13	.02	.85	.00	.61
Parent-Child stress	.95	6,24*	1.29	1.36	.53	2.30	1.39	.03	.46
Internalising-Mother	2.18	1.60	.59	1.63	.02	.01	.88	.01	.67
Externalising-Mother	2.05	1.76	1.58	.88	1.22	1.34	.34	.06	.75
Total-Mother	2.46^	1.63	2.09	1.35	1.19	1.50	.93	.03	1.12
Internalising-father	2.18	1.60	.59	1.63	.02	.01	.88	01	.68
Externalising-father	1.61	.06	.36	1.72	1.02	5.39*	.42	.02	.02
Total-father	3.01^	.00	.46	1.87	.87	4.34*	.44	.00	.09

^p<.10, * p<.05, **p<.01

Note: F ratios were obtained from two Manovas per background characteristic, one with study constructs at 4 and 12 months (N=123) and the other with study constructs at 24 months (N=47).

Appendix 9
Maternal, child and relationship risk and protective factors across infancy

	Infant age (months)							
	4		12		24			
Measures	Mean	*(SD)*	Mean	*(SD)*	Mean	*(SD)*	**F**	**Post Hoc**
Maternal depression	9.72	*(9.4)*	7.49	*(6.79)*	9.21	*(8.92)*	F(2,44)=2.16	
Positive marital relations	7.16	*(1.01)*	6.85	*(1.15)*	6.82	*(1.32)*	F(2,44)=5.03*	4>12=24
Negative marital relations	3.38	*(1.22)*	3.54	*(1.53)*	3.68	*(1.47)*	F(2,44)=2.61	
Child difficult temperament	2.48	*(.68)*	2.01	*(.45)*	2.13	*(.37)*	F(2,44)=13.78**	4>12=24
Life event stress	10.76	*(.97)*	6.74	*(.96)*	7.61	*(.06)*	F(2,44)=7.08**	4>12=24
Social emotional difficulty	26.28	*(2.69)*	20.64	*(2.27)*	21.34	*(2.09)*	F(2,45)= 2.66	

*p<.05, **p<.01, N=47

Associations across infancy of repeated measures

Repeated Measures	4 v 12	4 v 24	12 v 24
Maternal depression	.54**	.55**	.58**
Positive marital relations	.67**	.76**	.83**
Negative marital relations	.70**	.80**	.72**
Difficult temperament	.44**	.38**	.56**
Social emotional difficulty	.44**	.19	.10

p<.05, **p<.01

Appendix 10

Autoregression of repeated measures on mother reported toddler internalising, externalising and total problem behaviours at two years of age

		Internalising				Externalising				Total			
Step	**Model**	**$R^2\Delta$**	**B**	**SE**	**B**	**$R^2\Delta$**	**B**	**SE**	**B**	**$R^2\Delta$**	**B**	**SE**	**B**
1	Maternal depression 4	.38**	2.37	.46	.62**	.18**	2.62	.85	.42**	.36**	8.45	1.69	.60**
2	Maternal depression 4	.00	2.44	.54	.63**	.01	2.35	1.01	.38*	.00	8.25	2.01	.59**
	Maternal depression 12		-.14	.55	-.04		.53	1.02	.08		.39	2.03	.07
3	Maternal depression 4	.00	2.52	.59	.65**	.01	2.64	1.09	.42*	.00	8.53	2.17	.61**
	Maternal depression 12		-.04	.61	-.01		.87	1.12	.14		.72	2.24	.05
	Maternal depression 24		-.23	.61	-.06		-.86	1.14	-.14		-.83	2.27	-.06
1	Negative marital rels 4	.01	.35	.58	.09	.00	.22	.95	.03	.01	1.38	2.11	.10
2	Negative marital rels 4	.00	.19	.87	.05	.04	-1.21	1.39	-.19	.03	-1.06	3.12	-.08
	Negative marital rels 12		.23	.87	.06		-1.94	1.39	.31		3.32	3.13	.24
3	Negative marital rels 4	.09*	1.02	1.02	-.26	.02	-2.06	1.68	-.33	.07^	-4.92	3.68	-.35
	Negative marital rels 12		-.37	.89	-.09		1.53	1.47	.24		1.42	3.22	.10
	Negative marital rels 24		2.08	.99	.53*		1.46	1.64	.23		6.65	3.59	.47^
1	Positive marital rels 4	.01	-.36	.59	-.09	.00	.10	.95	.02	.01	-1.17	2.13	-.08
2	Positive marital rels 4	.00	-.03	.95	-.01	.01	-.67	1.53	-.11	.00	.97	3.44	-.07
	Positive marital rels 12		-.41	.94	-.11		.98	1.53	.16		-.25	3.43	-.02
3	Positive marital rels 4	.02	.25	1.00	.06	.00	-.80	1.64	-.13	.00	-.61	3.67	-.04
	Positive marital rels 12		.19	1.16	.05		.70	1.90	.11		.52	4.27	.04
	Positive marital rels 24		-.99	1.12	-.26		.46	1.83	.07		-1.26	4.10	-.09
1	Difficult temp 4	.21**	1.89	.52	.48**	.21**	2.86	.85	.45**	.30**	7.81	1.79	.55**
2	Difficult temp 4	.01	1.55	.59	.40*	.01	3.16	.98	.50**	.00	7.65	2.07	.54**
	Difficult temp 12		.71	.59	.18		-.61	.98	-.10		.33	.06	.02
3	Difficult temp 4	.10*	1.31	.56	.33*	.03	2.95	.98	.47**	.11**	6.75	1.95	.48**
	Difficult temp 12		.01	.61	.00		-1.22	1.08	-.19		-2.25	2.14	-.16
	Difficult temp24		1.53	.59	.39*		1.32	1.03	.21		5.62	2.05	.39**

		Internalising				Externalising				Total			
Step	**Model**	**$R^2\Delta$**	**B**	**SE**	**B**	**$R^2\Delta$**	**B**	**SE**	**B**	**$R^2\Delta$**	**B**	**SE**	**B**
1	Social emotional dif 4	.46**	2.68	.44	.68**	.25**	3.09	.81	.50**	.49**	9.87	1.52	.70**
2	Social emotional dif 4	.00	2.61	.48	.66**	.01	2.80	.89	.45**	.01	9.31	1.68	.66**
	Social emotional dif 12		.16	.48	.04		.70	.88	.12		1.35	1.66	.10
3	Social emotional dif 4	.01	2.54	.49	.64**	.01	2.72	.91	.44**	.03	8.90	1.67	.63**
	Social emotional dif 12		.18	.48	.03		.66	.89	.11		1.10	1.64	.08
	Social emotional dif 24		.41	.45	.11		.45	.83	.07		2.36	1.52	.08
1	Parent-other stress 4	.25**	2.00	.55	.50**	.20**	2.91	.91	.45**	.35**	8.75	1.88	.59**
2	Parent-other stress 4	.00	2.29	1.03	.57*	.01	1.91	1.71	.29	.00	7.66	3.53	.52*
	Parent-other stress 12		-.01	.04	.08		.04	.06	.18		.05	.13	.09
3	Parent-other stress 4	.02	1.81	1.12	.45	.00	1.68	1.89	.26	.03	5.68	3.83	.38
	Parent-other stress 12		-.04	.04	-.24		.03	.07	.13		-.05	.15	-.09
	Parent-other stress 24		.04	;.04	.30		.02	.06	.09		.16	.12	.34
1	Parent-child stress 4	.17**	1.63	.58	.41**	.09*	1.81	.91	.30*	.21**	6.42	1.97	.46**
2	Parent-child stress 4	.00	1.34	.93	.34	.04	.25	1.43	.04	.02	3.79	3.14	.27
	Parent-child stress 12		.02	.05	.09		.11	.08	.33		.19	.18	.24
3	Parent-child stress 4	.10*	.78	.93	.19	.06	-.42	1.46	-.07	.07^	2.09	3.15	.15
	Parent-child stress 12		-.04	.06	-.19		.04	.09	.11		.00	.20	.00
	Parent-child stress 24		.13	.06	.51*		.15	.09	.40		.38	.20	.44^
1	Life event stress 4	.00	.25	.59	.06	.00	-.02	.95	.00	.00	.08	.33	.04
2	Life event stress 4	.01	.05	.64	.01	.00	-.13	1.05	-.02	.01	-.04	.36	-.02
	Life event stress 12		.49	.64	.13		2.5	1.05	.04		.29	.36	.13
3	Life event stress 4	.01	.08	.65	.02	.01	-.18	1.06	-.03	.00	-.03	.36	-.02
	Life event stress 12		.66	.75	.17		-.09	1.23	-.01		.34	.42	.15
	Life event stress 24		-.32	.71	-.08		.64	1.16	.10		-.09	.37	-.04

^p<.10, * p<.05, ** p<.01, B-unstandardised regression coefficients, Beta-standardised regression coefficients

Appendix 11

Regression coefficients of the prediction of toddler problem behaviours from maternal and infant attachment

		Internalising						Externalising						Total					
Step	**Model**	**$R^2\Delta$**	**B**	**SE**	**B**	**sr^2**	**f^2**	**$R^2\Delta$**	**B**	**SE**	**B**	**sr^2**	**f^2**	**$R^2\Delta$**	**B**	**SE**	**B**	**sr^2**	**f^2**
1	Maternal attachment anxiety	.02	-.26	.25	-.16	.02	.02	.01	-.19	.41	-.07	.01	.01	.01	-.58	.91	-.09	.01	.01
2	Maternal attachment anxiety	.01	-.21	.26	-.12	.01	.01	.00	-.17	.43	-.06	.00	.00	.00	-.54	.96	-.09	.01	.01
	Infant attachment anxiety		-.24	.32	-.12	.01	.01		-.07	.52	-.02	.00	.00		-.13	1.17	-.02	.00	.00
3	Maternal attachment anxiety	.02	-.28	.27	-.17	.03	.03	.02	-.28	.44	-.10	.01	.01	.04	-.87	.99	-.14	.03	.03
	Infant attachment anxiety		-.30	.32	-.15	.02	.02		-.17	.53	-.05	.00	.00		-.43	1.18	-.06	.00	.00
	Manx by Ianx		.13	.12	.16	.02	.02		.18	.20	.15	.02	.02		.56	.45	.20	.04	.04
1	Maternal attachment anxiety	.02	-.26	.25	-.16	.02	.02	.01	-.19	.41	-.07	.01	.01	.01	-.58	.91	-.09	.01	.01
2	Maternal attachment anxiety	.15**	-.42	.24	-.25^	.06	.06	.01	-.25	.42	-.09	.01	.01	.05	-.91	.93	-.15	.02	.02
	Infant attachment avoidance		.59	.21	.40**	.15	.18		.22	.37	.09	.01	.01		1.25	.82	.23	.05	.05
3	Maternal attachment anxiety	.01	-.35	.26	-,21	.03	.03	.03	-.07	.45	-.03	.00	.00	.03	-.46	.99	-.08	.00	.00
	Infant attachment avoidance		.56	.22	.38*	.13	.15		.34	.38	.06	.00	.00		1.04	.83	.19	.03	.03
	Manx by Iav		-.08	.12	-.11	.01	.01		-.22	.21	-.17	.03	.03		-.54	.45	-.19	.03	.03
1	Maternal attach anx - AngM	.01	-.21	.29	-.10	.01	.01	.06	-.76	.46	-.24	.06	.06	.02	-.96	1.07	-.13	.02	.02
2	Maternal attach anx - AngM	.02	-.20	.29	-.10	.01	.01	.00	-.76	.47	-.24	.06	.06	.00	-.95	1.08	-.13	.02	.02
	Infant attachment anxiety		-.30	.30	-.15	.02	.02		-.12	.48	-.04	.00	.00		-.30	1.12	-.04	.00	.00
3	Maternal attach anx - AngM	.01	-.20	.30	-.10	.01	.01	.00	-.76	.47	-.24	.06	.06	.01	-.95	1.09	-.13	.02	.02
	Infant attachment anxiety		-.30	.31	-.15	.02	.02		-.11	.49	-.04	.00	.00		-.30	1.12	-.04	.00	.00
	Manx-AngM by Ianx		.13	.17	.12	.00	.00		.08	.27	.05	.00	.00		.32	.62	.08	.01	.01
1	Maternal attach anx - AngM	.01	-.21	.29	-.10	.01	.01	.06	-.76	.46	-.24	.06	.06	.02	-.96	1.07	-.13	.02	.02
2	Maternal attach anx - AngM	.12*	-.21	.28	-.11	.01	.01	.01	-.77	.47	-.24	.06	.06	.04	-.98	1.06	-.14	.02	.02
	Infant attachment avoidance		.51	.21	.34*	.12	.14		.17	.35	.07	.01	.01		1.07	.79	.20	.04	.04
3	Maternal attach anx - AngM	.02	-.26	.28	-.13	.02	.02	.01	-.71	.48	-.22	.05	.05	.00	-.93	1.08	-.13	.02	.02
	Infant attachment avoidance		.53	.21	.36*	.12	.14		.14	.36	.06	.00	.00		1.04	.81	.19	.04	.04
	Manx-AngM by Iav		.13	.13	.14	.02	.02		-.18	.22	-.12	.01	.01		-0.14	.51	-.04	.00	.00
1	Maternal attach anx - AngF	.05	-.58	.39	-.22	.05	.05	.02	-.65	.63	-.15	.02	.02	.05	-2.10	1.41	-.22	.05	.05
2	Maternal attach anx - AngF	.02	-.56	.39	-.21	.05	.05	.00	-.65	.64	-.15	.02	.02	.00	-2.08	1.43	-.22	.05	.05

		Internalising						Externalising						Total				
Step	**Model**	**$R^2\Delta$**	**B**	**SE**	**B**	**sr^2**	**f^2**	**$R^2\Delta$**	**B**	**SE**	**B**	**sr^2**	**f^2**	**$R^2\Delta$**	**B**	**SE**	**B**	**sr^2**	**f^2**
	Infant attachment anxiety		-.29	.30	-.14	.02	.02		-.11	.49	-.03	.00	.00		-.26	1.10	-.03	.00	.00
3	Maternal attach anx- AngF	.02	-.52	.39	-.20	.04	.04	.01	-.68	.65	-.16	.02	.02	.01	-2.00	1.45	-.21	.04	.04
	Infant attachment anxiety		-.30	.30	-.15	.02	.02		-.10	.50	-.03	.00	.00		-.28	1.11	-.04	.00	.00
	Manx-AngF by Ianx		.25	.24	.16	.02	.02		-.22	.39	-.09	.01	.01		.44	.88	.08	.01	.01
1	Maternal attach anx- AngF	.05	-.58	.39	-.22	.05	.05	.02	-.65	.63	-.15	.02	.02	.05	-2.09	1.41	-.22	.05	.05
2	Maternal attach anx- AngF	.15**	-.79	.37	-.30*	.09	.10	.01	-.74	.65	-.17	.03	.03	.06^	-2.57	1.41	-.27^	.07	.08
	Infant attachment avoidance		.59	.21	.40**	.15	.18		.25	.36	.11	.01	.01		1.35	.78	.25^	.06	.06
3	Maternal attach anx- AngF	.00	-.75	.38	-.28^	.07	.08	.02	-.59	.67	-.14	.02	.02	.04	-2.11	1.44	-.22	.05	.05
	Infant attachment avoidance		.59	.21	.40**	.15	.18		.24	.36	.10	.01	.01		1.33	.78	.25^	.06	.06
	Manx-AngF by Iav		-.06	.14	-.06	.00	.00		-.23	.25	-.14	.02	.02		-.69	.53	-.19	.04	.04
1	Maternal attach anx- Pas	.00	-.10	.48	-.03	.00	.00	.03	.84	.76	.16	.03	.03	.01	1.19	1.74	.10	.01	.01
2	Maternal attach anx- Pas	.02	.03	.50	.01	.00	.00	.01	.95	.80	.18	.03	.03	.01	1.40	1.81	.12	.01	.01
	Infant attachment anxiety		-.31	.32	-.15	.02	.02		-.28	.51	-.09	.01	.01		-.54	1.15	-.07	.01	.01
3	Maternal attach anx- Pas	.01	.03	.50	.01	.00	.00	.02	.94	.80	.18	.03	.03	.03	1.39	1.80	.12	.01	.01
	Infant attachment anxiety		-.39	.33	-.19	.03	.03		-.43	.53	-.13	.01	.01		-.97	1.20	-.13	.01	.01
	Manx-Pas by Ianx		.20	.26	.12	.01	.01		.40	.42	.15	.02	.02		1.15	.96	.19	.03	.03
1	Maternal attach anx- Pas	.00	-.10	.48	-.03	.00	.00	.03	.84	.76	.16	.03	.03	.01	1.19	1.74	.10	.01	.01
2	Maternal attach anx- Pas	.12*	-.37	.47	-.11	.01	.01	.00	.80	.79	.15	.02	.02	.03	.70	1.78	.06	.00	.00
	Infant attachment avoidance		.54	.22	.37*	.12	.14		.08	.37	.04	.00	.00		.99	.82	.18	.03	.03
3	Maternal attach anx- Pas	'.05	-.06	.50	-.02	.00	.00	.02	1.10	.86	.21	.04	.04	.02	1.49	1.93	.13	.02	.02
	Infant attachment avoidance		.53	.21	.36*	.12	.14		.07	.37	.03	.00	.00		.95	.82	.18	.03	.03
	Manx-Pas by Iavx		-.29	.18	-.24	.05	.05		-.29	.31	-.15	.02	.02		-.74	.70	-.17	.03	.03
1	Maternal attach avoidance	.00	-.02	.22	-.01	.00	.00	.00	'.06	.36	.03	.00	.00	.00	-.18	.81	-.03	.00	.00
2	Maternal attach avoidance	.12**	-.07	.21	-.05	.00	.00		.05	.36	.02	.00	.00		-.29	.81	-.05	.00	.00
	Infant attach avoidance		'.51	.21	.34*	.12	.14	.01	.16	.36	.07	.01	.01	.04	1.09	.81	.20	.04	.04
3	Maternal attach avoidance	.01	.03	.26	.02	.00	.00		-.02	.45	-.01	.00	.00		-.10	.99	-.02	.00	.00
	Infant attachment avoidance		.49	.22	.33*	.11	.12	.00	.18	.37	.07	.01	.01	.00	1.06	.82	.19	.04	.04
	Mav by Iav		-.07	.10	-.11	.01	0.00		.05	.18	.05	.00	.00		-.14	.39	-.06	.00	.00

		Internalising						Externalising						Total					
Step	**Model**	**$R^2\Delta$**	**B**	**SE**	**B**	**sr^2**	**f^2**	**$R^2\Delta$**	**B**	**SE**	**B**	**sr^2**	**f^2**	**$R^2\Delta$**	**B**	**SE**	**B**	**sr^2**	**f^2**
1	Maternal attach avoidance	.00	-.02	.22	-.01	.00	.00	.00	.06	.36	.03	.00	.00	.00	-.18	.81	-.03	.00	.00
2	Maternal attach avoidance	.02	-.04	.22	-.03	.00	.00	.00	.06	.36	.02	.00	.00	.00	-.21	.82	-.04	.00	.00
	Infant attachment anxiety		-.31	.31	-.15	.02	.02		-.13	.50	-.04	.00	.00		-.34	1.13	-.05	.00	.00
3	Maternal attachavoidance	.00	-.03	.23	-.02	.00	.00	.01	-.01	.38	-.01	.00	.00	.00	-.30	.86	-.06	.00	.00
	Infant attachment anxiety		-.31	.31	-.15	.02	.02		-.19	.51	-.06	.00	.00		-.43	1.16	-.06	.00	.00
	Mav by Ianx		.02	.16	.02	.00	.00		-.17	.25	-.11	.01	.00		-.23	.57	-.07	.00	.00
1	Maternal attach avoid-IDM	.06	-.65	.40	-.24	.06	.06	.00	-.04	.66	-.01	.00	.00	.03	-1.46	1.47	-.15	.03	.03
2	Maternal attach avoid-IDM	.08^	-.46	.39	-.17	.03	.03	.01	.04	.69	.01	.00	.00		-1.05	1.51	-.11	.01	.01
	Infant attachment avoidance		.44	.39	.30*	.08	.09		.17	.37	.07	.01	.01	.02	.93	.82	.17	.03	.03
3	Maternal attach avoid-IDM	.01	-.46	.40	-.17	.03	.03	.07^	.08	.67	.02	.00	.00		-.10	1.52	-.10	.01	.01
	Infant attachment avoidance		.43	.22	.29^	.08	.09		.28	.37	.12	.01	.01	.02	1.05	.83	.19	.04	.04
	Mav-IDM by Iav		-.08	.16	-.07	.00	.00		.48	.27	.26^	.07	.08		.58	.62	.14	.04	.04
1	Maternal attach avoid-IDM	.06	-.65	.40	.24	.06	.06	.00	-.04	.66	-.01	.00	.00	.02	-1.46	1.47	-.15	.02	.02
2	Maternal attach avoid-IDM	.01	-.61	.40	-.22	.05	.05	.00	-.01	.67	.00	.00	.00	.00	-1.42	1.50	-.14	.02	.02
	Infant attachment anxiety		-.25	.30	-.12	.01	.01		-.13	.50	-.04	.00	.00		-.17	1.12	-.02	.00	.00
3	Maternal attach avoid-IDM	.01	-.61	.41	-.22	.05	.05	.00	-.01	.68	.00	.00	.00	.00	-1.42	1.52	-.14	.02	.02
	Infant attachment anxiety		-.28	.31	-.14	.01	.01		-.09	.52	-.03	.00	.00		-.17	1.16	-.02	.00	.00
	MavIDM by Ianx		.11	.20	.08	.01	.01		-.15	.3	-.07	.00	.00		.00	.75	.00	.00	.00
1	Maternal attach avoid-IDF	.01	-.25	.409	-.10	.01	.01	.03	-.78	.63	-.18	.03	.03	.02	-1.49	1.43	-.15	.02	.02
2	Maternal attach avoid-IDF	.11*	.00	.39	.00	.00	.00	.00	-.75	.67	-.18	.03	.03	.03	-1.04	1.49	-.11	.01	.01
	Infant attachment avoidance		.50	.22	.34*	.11	.12		.03	.37	.02	.00	.00		.90	.83	.17	.03	.03
3	Maternal attach avoid-IDF	.00	-.01	.40	-.01	.00	.00	.00	-.79	.68	-.18	.03	.03	.01	.77	.88	.14	.02	.02
	Infant attachment avoidance		.49	.23	.33*	.09	.10		.01	.39	.00	.00	.00		.90	.83	.17	.03	.03
	MavIDF by Iav		-.05	.19	-.04	.00	.00		-.12	.32	-.06	.00	.00		-.36	.72	-.08	.01	.01
1	Maternal attach avoid-IDF	.01	-.25	.40	-.10	.01	.01	.03	-.78	.63	-.18	.03	.03	.02	-1.49	1.43	-.15	.02	.02
2	Maternal attach avoid-IDF	.03	-.28	.40	-.11	.01	.01	.00	-.79	.64	-.18	.03	.03	.00	-1.52	1.45	-.16	.02	.02
	Infant attachment anxiety		-.32	.30	-.16	.03	.03		-.17	.49	-.05	.00	.00		-.40	1.11	-.05	.00	.00
3	Maternal attach avoid-IDF	.01	-.41	.44	-.15	.02	.02	.03	-1.16	.70	-.27	.06	.06	.04	-2.40	1.59	-.25	.05	.05
	Infant attachment anxiety		-.38	.32	-.18	.03	.03		-.33	.51	-.10	.01	.01		-.78	1.14	-.10	.01	.01

		Internalising					Externalising						Total					
Step	**Model**	**$R^2\Delta$**	**B**	**SE**	**B**	**sr^2**	**f^2**	**$R^2\Delta$**	**B**	**SE**	**B**	**sr^2**	**f^2**	**$R^2\Delta$**	**B**	**SE**	**B**	**sr^2**	**f^2**
	MavIDF by Ianx		-.22	-.33	-.11	.01	.01		-.64	.53	-.20	.03	.03		-1.55	1.19	-.22	.04	.04
1	Maternal attach avoid-LM	.00	.05	.33	.02	.00	.00	.01	.28	.53	.08	.01	.01	.00	.15	1.20	.02	.00	.00
2	Maternal attach avoid-LM	.12*	.07	.31	.01	.00	.00	.01	.29	.53	.08	.01	.01	.04	.10	1.19	.02	.00	.00
	Infant attachment avoidance		.51	.21	.34*	.12	.14		.17	.36	.07	.01	.01		1.07	.80	.20	.04	.04
3	Maternal attach avoid-LM	.01	.02	.32	.01	.00	.00	.00	.25	.55	.07	.01	.01	.00	.12	1.23	.02	.00	.00
	Infant attachment avoidance		.52	.21	.35*	.12	.14		.18	.37	.08	.01	.01		1.08	.81	.20	.04	.04
	MavLM by Iav		.10	.13	.11	.01	.01		.08	.23	.06	.00	.00		.14	.51	.04	.00	.00
1	Maternal attach avoid-LM	.00	.05	.33	.02	.00	.00	.01	.28	.53	.08	.01	.01	.00	.15	1.20	.02	.00	.00
2	Maternal attach avoid-LM	.02	.03	.33	.01	.00	.00	.00	.27	.54	.08	.01	.01	.00	.12	1.22	.02	.00	.00
	Infant attachment anxiety		-.31	.31	-.15	.02	.02		-.11	.50	-.03	.00	.00		-.31	1.13	-.04	.00	.00
3	Maternal attach avoid-LM	.02	-5	.33	.02	.00	.00	.02	.31	.54	.09	.01	.01	.05	.24	1.20	.03	.00	.00
	Infant attachment anxiety		-.27	.31	-.13	.02	.02		-.05	.50	-.02	.00	.00		-.12	1.12	-.02	.00	.00
	MavLM by Ianx		-.16	.15	-.16	.02	.02		-.24	.24	-.15	.02	.02		-.78	.55	-.22	.05	.05
1	Maternal attach avoid-DerM	.02	.56	.57	.15	.02	.02	.07^	1.66	.90	.26^	.07	.08	.05	3.13	2.06	.22	.05	.05
2	Maternal attach avoid-DerM	.10*	.27	.56	.07	.01	.01	.00	1.54	.94	.26^	.07	.08	.02	2.64	2.11	.19	.03	.03
	Infant attachment avoidance		.48	.22	.32*	.10	.11		.02	.36	.01	.00	.00		.83	.81	.15	.02	.02
3	Maternal attach avoid-DerM	.00	.93	1.55	.24	.01	.01	.05	5.19	2.52	.83*	.09	.10	.03	9.28	5.73	.66	.06	.06
	Infant attachment avoidance		.41	.27	.27	.05	.05		-.38	.44	-.16	.03	.03		.07	1.01	.01	.00	.00
	MavDerM by Iav		-.31	.69	-.18	.03	.03		-1.70	1.12	-.60	.00	.00		-3.19	2.56	-.49	.03	.03
1	Maternal attach avoid-DerM	.02	.56	.57	.15	.02	.02	.07^	1.66	.90	.26^	.07	.08	.05	3.13	2.06	.22	.05	.05
2	Maternal attach avoid-DerM	.02	.50	.58	.13	.02	.02	.00	1.65	.92	.26^	.07	.08	.00	3.11	2.09	.22	.05	.05
	Infant attachment anxiety		-.28	.30	-.14	.02	.02		-.03	.48	-.01	.00	.00		-.13	.11	-.02	.00	.00
3	Maternal attach avoid-DerM	..04	1.19	.76	.31	.05	.05	.00	1.63	1.23	.26	.04	.04	.02	4.90	2.78	.35^	.07	.08
	Infant attachment anxiety		.03	.37	.01	.00	.00		-.04	.61	-.01	.00	.00		.66	1.37	.09	.01	.01
	MavDerM by Ianx		1.21	.87	.30	.04	.04		-.03	1.41	.00	.00	.00		3.13	3.19	.21	.02	.02
1	Maternal attach avoid-DerF	.01	-.30	.58	-.08	.00	.00	.00	-.30	.93	-.05	.00	.00	.02	-1.97	2.09	-.14	.02	.02
2	Maternal attach avoid-DerF	.12*	-.44	.55	-.11	.01	.01	.01	-.36	.95	-.06	.00	.00	.05	-2.29	2.07	-.16	.03	.03
	Infant attachment avoidance		.52	.12	.35*	.12	.14		.18	.36	.08	.01	.01		1.16	.80	.21	.05	.05
3	Maternal attach avoid-DerF	.00	-.28	.67	-.07	.00	.00	.00	-.25	1.15	-.04	.00	.00	.01	-1.53	2.52	-.11	.01	.01

		Internalising					Externalising					Total					
Step	**Model**	**$R^2\Delta$**	**B**	**SE**	**B**	**sr^2**	**f^2**	**$R^2\Delta$**	**B**	**SE**	**B**	**sr^2**	**f^2**	**$R^2\Delta$**	**B**	**SE**	**B**	**sr^2**	**f^2**
	Infant attachment avoidance		.52	.21	.35*	.12	.14		.18	.37	.08	.01	.01		1.16	.80	.21	.05	.05
	MavDerF by Iav		-.10	.22	-.08	.00	.00		-.06	.38	-.03	.00	.00		-.44	.82	-.10	.01	.01
1	Maternal attach avoid-DerF	.01	-.30	.58	-0.08	.01	.01	.00	-.30	.93	-.05	.00	.00	.02	-1.20	2.09	-.14	.02	.02
2	Maternal attach avoid-DerF	.03	-.39	.58	-.10	.01	.01	.00	-.35	.95	-.06	.00	.00	.00	-2.10	2.13	-.15	.02	.02
	Infant attachment anxiety		-.34	.31	-.17	.03	.03		-.16	.50	-.05	.00	.00		-.48	.1.12	-.06	.00	.00
3	Maternal attach avoid-DerF	.03	-2.96	2.28	-.76	.04	.04	.03	-4.46	3.75	-.71	.03	.03	.03	-10.86	8.39	.77	.04	.04
	Infant attachment anxiety		-.91	.58	-.45	.05	0.05		-1.08	.96	-.33	.03	.03		-2.45	2.14	-.33	.03	.03
	MavDerF by Ianx		-2.24	1.93	-.70	.03	0.03		-3.59	3.17	.70	.03	.03		-7.66	7.09	-.66	.03	.03

^ p<.10, * p<.05, ** p<.01, B-unstandardised regression coefficients, Beta-standardised regression coefficients

Appendix 12

Regressions of the effects of difficult temperament and infant attachment anxiety and avoidance on mother reported toddler internalising, externalising and total problem behaviours

		Internalising						Externalising						Total					
Step	Model	$R^2\Delta$	B	SE	B	sr^2	f^2	$R^2\Delta$	B	SE	B	sr^2	f^2	$R^2\Delta$	B	SE	B	sr^2	f^2
1	Dif temp 4	.23**	1.87	.51	.48**	.23	.30	.21	2.86	.83	.46**	.21	.27	.31**	7.88	1.75	.56**	.31	.45
2	Dif temp 4		2.00	.46	.52**	.26	.35	.01	2.92	.84	.47**	.22	.28	.06*	8.17	1.70	.58**	.34	.52
	Infant attach avoid	.15**	.57	.18	.38**	.15	.18		.26	.32	.11	.01	.01		1.33	.65	.25*	.06	.06
3	Difficult temperament		1.81	.46	.47**	.21	.27	.01	3.07	.86	.49**	.23	.30	.01	7.83	1.74	.55	.29	.41
	Infant attach avoid	.05^	.52	.17	.35**	.12	.14		.31	.33	.13	.01	.01		1.24	.66	.23^	.05	.05
	Dif temp 4 by Iatt avoid		.32	.16	.23^	.05	.05		-.26	.31	-.12	.01	.01		.57	.62	.11	.01	.01
1	Infant attach avoid	.12*	.52	.21	.35*	.12	.14	.01	.19	.36	.08	.01	.01	.05	1.17	.80	.21	.05	.05
2	Infant attach avoid	.26**	.51	.18	.34**	.12	.14	.08^	.18	.35	.08	.01	.01	.24**	1.13	.70	.21	.05	.05
	Dif temp 24		2.02	.47	.51**	.26	.35		1.79	.93	.28^	.08	.09		6.97	1.85	.49**	.24	.32
3	Infant attach avoid	.05^	.54	.18	.36**	.13	.15	.00	.17	.36	.07	.01	.01	.01	1.17	.71	.21	.05	.05
	Dif temp 24		1.87	.47	.47**	.22	.28		1.85	.95	.29^	.08	.09		6.79	.19	.47**	.24	.32
	Dif temp 24 by Iatt avoid		.34	.18	.23^	.05	.05		-.12	.37	-.05	.00	.00		.40	.73	.07	.01	.01
1	Dif temp 4	.23**	1.87	.51	.48**	.23	.30	.21**	2.86	.83	.46**	.21	.27	.31**	7.88	1.75	.56**	.31	.45
2	Dif temp 4	.02	1.88	.50	.48**	.23	.30	.00	2.86	.84	.46**	.21	.27	.00	7.88	1.77	.56**	.31	.45
	Infant attach anx		-.31	.27	-.15	.02	.02		-.14	.44	-.04	.00	.00		-.33	.93	-.05	.00	.00
3	Dif temp 4	.00	1.89	.53	.49**	.22	.28	.01	3.00	.88	.48**	.21	.27	.01	8.17	1.85	.58**	.31	.45
	Infant attach anx		-.31	.27	-.15	.02	.02		-.15	.65	-.05	.00	.00		-.35	.94	-.05	.00	.00
	Dif temp 4 by Iatt anx		.03	.38	.01	.00	.00		.39	.62	.09	.01	.01		.78	1.30	.08	.01	.01
1	Infant attach anx	.02	-.32	.31	.16	.02	.02	.00	-.15	.50	-.05	.00	.00	.00	-.40	1.12	-.05	.00	.00
2	Infant attach anx	.27**	-.31	.26	-.15	.02	.02	.08^	-.15	.48	-.04	.00	.00	.24**	-.38	.99	-.05	.00	.00
	Dif temp 24		2.03	.51	.52**	.27	.37		1.80	.93	.28^	.08	.09		7.00	1.90	.49**	.24	.32
3	Infant attach anx	.03	-.32	.26	-.16	.02	.02	.00	-.15	.49	-.05	.00	.00	.01	-.41	1.00	-.06	.00	.00
	Dif temp 24		1.79	.54	.45**	.18	.22		1.68	1.01	.26	.06	.06		6.47	2.05	.45**	.18	.22
	Dif temp 24 by Iatt anx		-.43	.35	-.17	.03	.03		-.22	.65	-.05	.00	.00		-.95	1.32	-.10	.01	.01

		Internalising						Externalising						Total					
Step	**Model**	**$R^2\Delta$**	**B**	**SE**	**Β**	**sr^2**	**f^2**	**$R^2\Delta$**	**B**	**SE**	**Β**	**sr^2**	**f^2**	**$R^2\Delta$**	**B**	**SE**	**Β**	**sr^2**	**f^2**
1	Dif temp 4	.23**	1.87	.51	.48**	.23	.30	.21	2.86	.83	.46**	.21	.27	.31**	7.88	1.75	.56**	.31	.45
2	Dif temp 4		2.00	.46	.52**	.26	.35	.01	2.92	.84	.47**	.22	.28	.06*	8.17	1.70	.58**	.34	.52
	Infant attach avoid	.15**	.57	.18	.38**	.15	.18		.26	.32	.11	.01	.01		1.33	.65	.25*	.06	.06
3	Difficult temperament		1.81	.46	.47**	.21	.27	.01	3.07	.86	.49**	.23	.30	.01	7.83	1.74	.55	.29	.41
	Infant attach avoid	.05^	.52	.17	.35**	.12	.14		.31	.33	.13	.01	.01		1.24	.66	.23^	.05	.05
	Dif temp 4 by Iatt avoid		.32	.16	.23^	.05	.05		-.26	.31	-.12	.01	.01		.57	.62	.11	.01	.01
1	Infant attach avoid	.12*	.52	.21	.35*	.12	.14	.01	.19	.36	.08	.01	.01	.05	1.17	.80	.21	.05	.05
2	Infant attach avoid	.26**	.51	.18	.34**	.12	.14	.08^	.18	.35	.08	.01	.01	.24**	1.13	.70	.21	.05	.05
	Dif temp 24		2.02	.47	.51**	.26	.35		1.79	.93	.28^	.08	.09		6.97	1.85	.49**	.24	.32
3	Infant attach avoid	.05^	.54	.18	.36**	.13	.15	.00	.17	.36	.07	.01	.01	.01	1.17	.71	.21	.05	.05
	Dif temp 24		1.87	.47	.47**	.22	.28		1.85	.95	.29^	.08	.09		6.79	.19	.47**	.24	.32
	Dif temp 24 by Iatt avoid		.34	.18	.23^	.05	.05		-.12	.37	-.05	.00	.00		.40	.73	.07	.01	.01
1	Dif temp 4	.23**	1.87	.51	.48**	.23	.30	.21**	2.86	.83	.46**	.21	.27	.31**	7.88	1.75	.56**	.31	.45
2	Dif temp 4	.02	1.88	.50	.48**	.23	.30	.00	2.86	.84	.46**	.21	.27	.00	7.88	1.77	.56**	.31	.45
	Infant attach anx		-.31	.27	-.15	.02	.02		-.14	.44	-.04	.00	.00		-.33	.93	-.05	.00	.00
3	Dif temp 4	.00	1.89	.53	.49**	.22	.28	.01	3.00	.88	.48**	.21	.27	.01	8.17	1.85	.58**	.31	.45
	Infant attach anx		-.31	.27	-.15	.02	.02		-.15	.65	-.05	.00	.00		-.35	.94	-.05	.00	.00
	Dif temp 4 by Iatt anx		.03	.38	.01	.00	.00		.39	.62	.09	.01	.01		.78	1.30	.08	.01	.01
1	Infant attach anx	.02	-.32	.31	.16	.02	.02	.00	-.15	.50	-.05	.00	.00	.00	-.40	1.12	-.05	.00	.00
2	Infant attach anx	.27**	-.31	.26	-.15	.02	.02	.08^	-.15	.48	-.04	.00	.00	.24**	-.38	.99	-.05	.00	.00
	Dif temp 24		2.03	.51	.52**	.27	.37		1.80	.93	.28^	.08	.09		7.00	1.90	.49**	.24	.32
3	Infant attach anx	.03	-.32	.26	-.16	.02	.02	.00	-.15	.49	-.05	.00	.00	.01	-.41	1.00	-.06	.00	.00
	Dif temp 24		1.79	.54	.45**	.18	.22		1.68	1.01	.26	.06	.06		6.47	2.05	.45**	.18	.22
	Dif temp 24 by Iatt anx		-.43	.35	-.17	.03	.03		-.22	.65	-.05	.00	.00		-.95	1.32	-.10	.01	.01

Beta- standardised regression coefficients, B- unstandardised regression coefficients, sr2- semi partial correlation. * p<.05, ** p<.01, *** p<.001. f^2= Cohen's effects size= $r^2/(1-r^2)$, .02 small, .15 medium, .35 large

Appendix 13
Means difference tests for mothers' parent-other and parent-child stress trajectories

	Parent-child stress					Parent-other stress				
	low		***elevated***		***F(df)***	***low***		***elevated***		***F(df)***
At 4 months										
Maternal age (years)	32.36	(.54)	31.95	0.94	F(1,90)=.14	32.20	(.51)	32.67	(1.15)	F(1,91)=.14
Rel length (years)	5.33	(.10)	3.76	(.73)	F(1,90)=.01	4.89	(.41)	5.13	(.93)	F(1,91)=.06
Family income	5.22	(.28)	5.26	(.49)	F(1,90)=.01	-.10	(.64)	1.01	(.44)	F(1,91)=.08
Number of siblings	.58	(.10)	.57	(.17)	F(1,90)=.01	.14	(.90)	-.81	(.62)	F(1,91)=.36
Maternal education	5.29	(.26)	5.52	(.46)	F(1,90)=.19	1.85	(.43)	4.03	(.30)	F(1,91)=.10
Separation (hrs/week)	4.78	(.99)	5.44	(1.71)	F(1,90)=.11	3.17	(.82)	13.13	(1.88)	F(1,91)=23.66**
Maternal depression	7.22	(.87)	19.46	(1.63)	F(1,106)=43.45**	7.07	(.74)	22.37	(1.59)	F(1,106)=76.10**
Maternal att anxiety	-.16	(.23)	.59	('.44)	F(1,106)=2.28	-0.40	(.21)	1.01	(.44)	F(1,106)=15.71**
Maternal att avoid	.13	(.28)	-.49	(.52)	F(1,106)=1.14	.25	(.27)	-0.83	(.58)	F(1,106)=2.88
Neg marital relations	3.09	(.15)	3.73	(.28)	F(1,106)=4.22*	3.07	(.14)	3.93	(.31)	F(1,106)=6.60**
Pos marital relations	7.11	(.13)	6.95	(.23)	F(1,106)=.37	7.11	(.12)	6.97	(.26)	F(1,106)=.25
Difficult temperament	2.36	(.07)	2.91	(.13)	F(1,106)=14.45**	2.38	(.07)	2.95	(.14)	F(1,106)=12.67**
Parent-other stress	114.65	(4.26)	151.05	(6.15)	F(1,102)=23.70**	110.86	(1.95)	166.23	(4.16)	F(1,106)=145.29**
Parent-child stress	86.15	(2.99)	111.68	(4.31)	F(1,102)=43.45**	90.07	(1.93)	113.90	(4.10)	F(1,106)=27.14**
At 12 months										
Separation (hrs/week)	14.67	"(2.19)	15.00	(3.40)	F(1,101)=.60	11.48	(1.27)	20.41	(2.69)	F(1,103)=6.79**
Infant att anxiety	-.16	(.20)	-.89	(1.19)	F(1,101)=.42	-0.12	(.20)	0.10	(.42)	F(1,103)=.22
Infant att avoidance	0.30	(.31)	-1.79	(1.89)	F(1,101)=.20	-0.03	(.30)	.38	(.65)	F(1,103)=.26
Parent-other stress	105.88	(3.30)	145.00	(4.77)	F(1,103)=45.49**	104.42	(2.32)	157.71	(4.93)	F(1,104)=101.55**
Parent-child stress	79.80	(2.09)	108.50	(3.02)	F(1,103)=61.14**	83.73	(1.72)	112.19	(3.66)	F(1,104)=50.17**
At 24 months										
Separation (hrs/week)	19.09	(2.37)	17.75	(3.68)	F(1,37)=.01	16.67	(2.31)	21.38	(4.54)	F(1,37)=.86
Parent-other stress	109.92	(4.24)	152.58	(6.12)	F(1,37)=32.86**	111.42	(3.73)	164.00	(7.33)	F(1,37)=40.87**
Parent-child stress	82.44	(1.75)	109.42	(2.53)	F(1,37)=77.09**	86.42	(2.55)	105.50	(5.02)	F(1,37)=11.49**

**p<.01, *p<.05

Appendix 14

Comparison of average item differences for the "at risk" versus "low" infant social emotional difficulty trajectories when infants were aged 4, 12 and 24 months

	4 months					12 months					24 months				
	At risk		Low			At risk		Low			At risk		Low		
Item	*Mean*	*SD*	*Mean*	*SD*	F(1,114)	*Mean*	*SD*	*Mean*	*SD*	F(1,107)	*Mean*	*SD*	*Mean*	*SD*	F(1,45)
1	3.08	*4.35*	0.39	*1.94*	15.56**	0.83	*1.95*	0.05	*0.51*	10.52**	1.00	*2.24*	.12	*.77*	5.67*
2	0.77	*1.88*	0.10	*.69*	6.51*	2.92	*2.58*	2.37	*3.07*	.35	2.00	*2.74*	1.90	*3.30*	6.42*
3	0.77	*1.88*	0.34	*1.27*	1.18	1.25	*2.26*	0.67	*1.71*	1.14	1.00	*2.24*	.00	*.00*	10.05**
4	2.31	*2.59*	1.89	*2.81*	.26	1.25	*2.26*	1.33	*2.21*	.01	.00	*.00*	.36	*1.30*	.37
5	1.54	*2.40*	0.29	*1.18*	9.72**	0.83	*0.00*	1.95	*0.00*	19.04**	.00	*.00*	.12	*.77*	.12
6	0.00	*.00*	0.24	*1.08*	.65	0.83	*1.95*	1.03	*2.16*	.09	5.00	*5.00*	.6	*1.64*	29.96**
7	0.38	*1.39*	0.19	*.97*	.40	0.00	*0.00*	0.26	*1.11*	.64	1.00	*2.24*	.36	*1.30*	4.13*
8	5.77	*4.00*	2.67	*3.27*	9.85**	1.67	*2.46*	0.26	*1.11*	12.25**	.00	*.00*	.00	*.00*	
9	6.15	*3.00*	1.70	*2.76*	29.50**	2.92	*2.58*	0.62	*2.20*	11.26**	.00	*.00*	.83	*1.89*	.96
10	2.69	*3.30*	.53	*1.70*	14.38**	4.58	*3.34*	2.47	*2.99*	5.19*	.00	*.00*	.00	*.00*	
11	3.08	*4.80*	.53	*1.70*	14.86**	.00	*.00*	.05	*.51*	.12	3.00	*2.74*	1.31	*2.23*	16.03**
12	5.77	*3.44*	1.70	*3.02*	20.37**	2.08	*2.58*	1.86	*2.92*	.07	1.00	*2.24*	.95	*1.99*	4.21*
13	2.69	*3.88*	.69	*1.99*	9.14**	2.08	*3.34*	1.34	*2.34*	.97	1.00	*2.24*	.95	*2.53*	2.72
14	7.69	*5.25*	2.86	*4.52*	12.72**	2.50	*4.53*	.98	*2.46*	3.27^	.00	*.00*	.12	*.77*	.12
15	1.92	*3.25*	.87	*2.15*	2.42	6.25	*3.77*	3.09	*3.78*	7.45**	.00	*.00*	1.86	*9.00*	.21
16	10.77	*2.77*	4.22	*3.95*	33.56**	.42	*.21*	1.44	*1.00*	.43	6.00	*2.24*	3.21	*4.11*	24.01**
17	3.46	*4.27*	.63	*2.49*	12.36**	3.33	*4.92*	.57	*2.27*	11.50**	2.00	*2.74*	1.43	*2.77*	6.89*
18	3.85	*4.63*	1.36	*2.82*	7.63**	2.92	*3.97*	1.60	*2.66*	2.34	2.00	*2.74*	.83	*1.89*	9.18**
19	3.46	*3.76*	.63	*2.06*	17.48**	.83	*1.95*	.36	*1.49*	1.00	.00	*.00*	.60	*1.98*	.45
20						.83	*1.95*	.05	*.51*	10.52**	1.00	*2.24*	1.31	*2.48*	3.93^
21						.83	*1.95*	.77	*1.82*	.01	.00	*.00*	.36	*1.30*	.37
22						1.25	*3.11*	.41	*1.56*	2.36	.00	*.00*	.00	*.00*	
23											1.00	*2.24*	.12	*.77*	5.67*
24											1.00	*2.24*	.71	*1.77*	3.98^
25											2.00	*2.74*	1.67	*2.39*	10.27**
26											.00	.00	.24	1.08	

^p<.10, *p<.05, **p<.01

Appendix 15

Means, standard deviations and mean difference tests for social emotional difficulty trajectories across infancy

	low		at risk		Mean Difference
	Mean	*(SD)*	*Mean*	*(SD)*	*F(df)*
At 4 months					
Background variables					
Maternal age (years)	32.31	(.53)	33.13	1.37	F(1,88)=.31
Rel length (years)	4.95	(.40)	6.14	(1.04)	F(1,88)=1.14
Family income	5.26	(.26)	4.27	(.62)	F(1,88)=1.95
Number of siblings	.59	(.09)	.55	(.23)	F(1,88)=.03
Maternal education	5.70	(.24)	4.82	(.62)	F(1,88)=1.73
separation (hours/week)	3.99	(.86)	6.09	(2.21)	F(1,88)=.79
Study variables					
Maternal depression	8.37	(.79)	27.20	(2.46)	F(1,105)=53.19**
Maternal attach anxiety	-.20	(.21)	.80	(.64)	F(1,105)=2.22
Maternal attach avoid	.11	(.26)	-.37	(.82)	F(1,105)=.32
Neg marital relations	3.10	(.13)	3.84	(.41)	F(1,105)=2.89^
Pos marital relations	7.13	('.11)	7.05	(.35)	F(1,105)=.06
Difficult temperament	2.43	(.06)	2.99	(.20)	F(1,105)=6.91**
Parent-other stress	117.33	(2.67)	157.70	(8.33)	F(1,105)=21.31**
Parent-child stress	90.93	(1.80)	120.20	(5.62)	F(1,105)=24.63**
Social emotional dif	21.63	(1.43)	63.33	(4.02)	F(1,105)=95.65**
At 12 months					
Separation (hours/week)	13.59	-1.28	16.91	(3.29)	F(1,88)=.89
Infant attach anxiety	-.05	(.18)	.32	(.56)	F(1,105)=.38
Infant attach avoidance	-.01	(.27)	1.06	(.83)	F(1,105)=1.48
Parent-other stress	111.08	(2.73)	145.17	(7.69)	F(1,105)=19.43**
Parent-child stress	86.37	(1.79)	104.83	(5.03)	F(1,105)=11.95**
Social emotional difficulty	40.42	(3.96)	19.83	(1.41)	F(1,105)=23.95**
At 24 months					
Separation (hours/week)	17.07	(2.03)	22.75	(6.65)	F(1,45)=.67
Parent-other stress	120.00	(4.48)	152.50	(13.98	F(1,45)=4.90*
Parent-child stress	89.03	(2.35)	107.25	(7.35	F(1,45)=5.58*
Social emotional difficulty	21.62	(2.20)	33.75	(6.88)	F(1,41)=2.82
Internalising	4.77	(.58)	9.75	(1.82)	F(1,41)=6.79*
Externalising	11.85	(.97)	15.00	(3.04)	F(1,41)=.98
Total	27.77	(2.13)	43.25	(6.65)	F(1,41)=4.91*

**p<.01, *p<.05, ^p<.10